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ABSTRACT

Between 1978 and 1995, Colombia made a U-turn in income inequality and underwent significant changes in key socio-demographic characteristics and labor market indicators. The dynamics of inequality were asymmetric: while rural inequality improved, the opposite happened in urban areas with predominant effects on national income distribution. In this paper we measure the specific contributions of determinant factors of household income to the dynamics of urban and rural inequality for the periods 1978-88 and 1988-95. Using a microeconomic reduced form model of individual labor earnings and labor market participation and occupational choice, we decompose the changes in inequality derived from variations in (i) the returns to human assets -education and experience- and the residual variance; (ii) the changes in endowments of human assets –schooling- and in family size; and (iii) the structural changes in labor force participation and occupational choice. Our findings show that periods of moderate inequality changes conceal strong counterbalancing effects of equalizing and unequalizing forces. The dynamics of income inequality in Colombia might be decomposed as a combination of persistent and fluctuating forces. In urban areas the four persistent factors are *jointly* unequalizing: education endowment equalization, family size, non-labor income and participation and occupational choice –at the individual level-. However, the larger and unstable effects of five other fluctuating factors dominate them –e.g. returns to education-. Paradoxically, education endowment equalization worsens income inequality in urban areas but improves it in rural areas. This apparent contradiction can be explained by the large differences in returns to education prevalent in the urban areas. It is also surprising that increasing participation of less skilled women generated asymmetric effects between household and individual wage distributions. Although households appear to exacerbate static inequality among workers, they also attenuate the *changes* in individual income inequality produced by each determinant factor. Finally, unless the increasing trend of skill wage differentials is reversed, the aggregate effect of persistent inequality determinants leads to expect an increasing deterioration of long run inequality trends.

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[†] ***Important Note:*** *The methodological framework required to track section 3 –decomposition- appears in another paper of the collective volume (Bourguignon, Ferreira and Lustig, eds.) to be published. For the moment, the reader may use file SpecialMethAppendix II.pdf as a substitute.*

Final Draft
Comments welcome

The Reversal of Inequality Trends in Colombia, 1978-1995: A Combination of Persistent and Fluctuating Forces [*]

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By the late 1970s, the Colombian economy had completed two decades of consistent reduction in income inequality and had improved its standing with respect to other Latin American countries. For some time income inequality in Colombia was exemplary of Kuznets' well-known inverted U-shaped curve: after the growing inequality of the first half of the XXth century, substantial inequality reductions were observed during 1960s and 1970s as the economy grew. However, during the late 1970s and the 1980s, the inequality improvements became marginal; and in the late 1980s, inequality took a "U-turn", completely reversing the equity gains of the two previous decades.

The rise in national inequality during the 1988-95 period in Colombia was driven by the large increases in inequality in the urban sector, as well as by the simultaneous increase in inequality *between* urban and rural areas. *Rural* inequality was evolving partially in the opposite direction: during the 1980s, inequality increased, but achieved a considerable fall in the early 1990s. Simultaneously with these asymmetric inequality reversals, the Colombian economy experienced significant changes in key labor market indicators, as well as in the socio-demographic characteristics of the working population, variables that should explain a good share of the dynamics of income distribution. From 1978 to 1995, the most significant changes experienced by

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the urban population of working age were the following: i) greater work experience and higher educational attainment –particularly among women-; ii) reductions in fertility and smaller family sizes; ii) a reduction of the gender earnings gap; iv) a reduction in wage differentials by education, mostly in the rural areas –and with the exception of urban college graduates-; v) increased labor market participation -mainly among women-; and vi) an increase in the share of self-employed *vis-à-vis* wage earners in the urban economically active population (E.A.P.) and vice versa, in the rural E.A.P .

At the same time, the Colombian economy was subject to major structural reforms and macroeconomic changes that modified key labor market parameters and affected labor market performance through different channels. The structural reforms of the early 1990s covered several areas: trade liberalization and trade integration agreements with neighbor countries; liberalization of the capital account; and major changes in labor and social security legislation which increased the relative cost of labor with respect to capital, and became a source of difficulty for the creation of wage-earning jobs *vis-à-vis* self-employment opportunities. In addition, the economy suffered supply shocks derived from major discoveries of oil reserves that raised the expectations of exchange rate appreciation and led to a jump in export revenues during the second half of the 1990s. Rural economic activities experienced a marginal shift from agriculture and industry to mining and services. In addition, during the late 1970s and early 1980s, agriculture was subject to a higher than normal concentration of land and credit. Finally, in the early 1990s agriculture received a set of negative shocks via lower tariff protections, a real exchange appreciation, lower international prices, droughts and violence.

The purpose is to decompose the dynamics of income inequality –urban and rural- by measuring the specific contribution of each determinant factor to the income generation process. . Within a reduced form model of individual earnings and participation in the labor market, the factors to evaluate are (i) the returns to observable human assets (education, experience) and regional location premiums; (ii) the changes in household characteristics and their human capital endowment; (iii) the structural changes in labor force participation and occupational choice; and finally, (iv) the changes in residual variance of the earnings equations -the earnings to unobserved productive characteristics–. For that purpose, we adopt a microecomic model of the labor market –on income generation and labor activity- and estimate their structural parameters for two occupational groups –wage earners and self-employed- divided by gender. Given these functional relationships, the parameter estimates, and using the simulation technique provided by Bourguignon, Ferreira and Lustig (2000), we then decompose the changes in inequality and measure the contribution of each factor for the periods 1978-88, and 1988-95.

Our findings show that periods with moderate changes in inequality conceal strong counterbalancing effects of equalizing and unequalizing forces. The most powerful determinants of individual income distribution dynamics are returns to education, schooling endowments and residual variance, in addition to family size and non-labor income for household income. However, over time, some powerful factors are unstable, while others, with smaller effects, are more persistent.

Decomposing the dynamics of urban income inequality reveals a complex situation. The reduction of urban inequality of *individual* earnings between 1978-88 was produced by a set of equalizing forces, partially counterbalanced by two regressive factors. The equalizing factors were diminishing earning differentials across educational groups, between occupational groups –gender differentials- and smaller residual variance in the earning equation. The two unequalizing factors are the increase in the educational endowments and the increase in labor force participation derived from parameter changes of the estimated model. At the *household* level, the effect of regressive factors was stronger and neutralized the aggregate effect of equalizing determinants, which included the reduction of household size. The severe rise in inequality of individual and household incomes from 1988 to 1995 is essentially explained by some reversal in the evolution of earning differentials between occupations, increasing residual variance, education endowment equalization and by more unequal non-labor income.

One of our main findings is contrary to our expectations. Intuitively, a greater and more egalitarian education endowment in both urban and rural areas should yield reductions of income inequality. However, according to our decomposition exercise, this was only true in rural areas. Paradoxically, education endowment equalization deteriorated the income distribution in urban areas in both periods -1978-88 and 1988-95. Some basic analysis shows this apparent contradiction is explained by the strong convexity of the earnings functions and by the larger inter-quintile differences in returns to education prevalent in urban areas –with respect to rural areas.

A combination of persistent and fluctuating forces characterizes the dynamics of urban income inequality in Colombia between 1978 and 1995. The persistent forces are linked to demographics and labor supply: the evolution of family behavior –smaller family size and increased labor participation of women- and the growth of educational endowments. The unstable or fluctuating factors tend to respond to changes in the labor demand function, namely to its labor skill profile. Although the aggregate effect of persistent factors is moderate in size –*vis-à-vis* fluctuating ones-, it is perhaps the best indicator of long-run inequality trends.

This paper is divided into four parts. In the first section, we examine the evolution of inequality and poverty indicators for three years: 1978, 1988 and 1995, as well as the changes in labor market

indicators and socio-demographic characteristics of households. We also briefly review the main structural reforms and macroeconomic developments that affected labor market performance. In the second section, we model the income generating process and provide estimates of parameters that describe the evolution of the structure of earnings and participation behavior. The following section discusses the outcome of the decomposition exercises, which measures the contribution of different factors to the total inequality change. Finally, we summarize and conclude.

1. The Colombian income distribution: 1978, 1988 and 1995[1]

1.1 The Loss of the Inequality Gains of the 60s and 70s

Several authors have identified the mid 1960s as the breaking point in the regressive trend of income distribution during the first half of the XXth century.[2] But the rise of national income inequality indicators during the last decade shows a clear reversal of the progressive inequality trends of the 60s and 70s. While reductions in inequality levels were constant from 1960 to 1978, they plateaued from 1978 to 1988 and clearly reversed from 1988 to 1995. Table 1 shows that from 1978 to 1988, the pace of reduction of income inequality was almost non-existent – when measured by the Gini and the Theil indexes.[3] During the first half of the 1990s, inequality levels increased considerably, clearly erasing the gains of previous decades.

[1]Economic indicators for the years 1978, 1988 and 1995 are adequate for inter-temporal comparison. In those three years, economic activity is almost at the peak of the business cycle. Growth is close to or higher than 4% and unemployment is low, between 8% and 10%.

[2]Urrutia (1984), Reyes (1987), Ocampo (1992), Londoño (1995). Declining wage differentials of the 1970s fostered significant improvements in inequality (Misión de Empleo, 1986). According to Ocampo *et al.* (1998) the determinants behind these developments were: 1) the reduction of the rural labor force surplus, due to fast migration in the 1950s; 2) the robust pace of capital accumulation and modernization in the rural sector; and 3) the larger and well targeted investment in education and health delivered through the "Frente Nacional". On the progressivity of public social expenditure, see Selowsky (1976) and Vélez (1996).

[3]Although there is some ambiguity to it, since the rise in the mean log deviation shows some more inequality in the lower tail of the distribution, while the lower transformed coefficient of variation shows the opposite in the upper tail.

Table 1. *Decomposition of Total Inequality between Rural and Urban Areas. Colombia, 1978, 1988 and 1995.*

	1978					*1988*					*1995*				
	Urban	*Rural*	*Total*	*Decomposition*		*Urban*	*Rural*	*Total*	*Decomposition*		*Urban*	*Rural*	*Total*	*Decomposition*	
				Between	*Within*				*Between*	*Within*				*Between*	*Within*
Household Inequality															
Gini Coefficient	50.2	43.5				50.2	44.4				54.4	40.7			
Mean log deviation, E(0)	38.0	33.8	44.7	8	36	42.5	37.3	49.6	9	40	50.5	30.0	55.8	13	42
Theil, E(1)	52.6	34.6	56.0	8	48	50.3	35.0	55.2	8	47	70.6	29.4	74.7	11	63
Tran. Coeff. of variation E(2)	153.6	60.3	170.4	7	163	105.1	50.5	122.2	7	115	282.7	45.8	331.5	10	321
Population Share	57.4	42.6				60.2	39.8				60.7	39.3			
Income Share	76.1	23.9				79.0	21.0				82.6	17.4			
Relative Income (to the mean)	1.3	0.6				1.3	0.5				1.4	0.4			

	Urban	*Rural*	*Urban*		*Urban*	*Rural*	*Urban*		*Urban*	*Rural*	*Urban*	
Gini Coefficients			*Males*	*Females*			Males	Females			Males	Females
All Individuals	47.8	38.5			44.7	39.0			50.3	36.6		
Wage Earner			42.1	32.7			39.5	34.3			45.0	39.1
Self-employed			60.8	54.0			53.5	59.0			59.4	57.4

Source: DANE, Encuesta Nacional de Hogares. Authors' calculations.

Income inequality indexes for urban and rural areas are relatively stable from 1978 to 1988 but exhibit opposite tendencies during the 1988-95 period. Table 1 shows a completely flat Gini coefficient and a slight reduction of the Theil index of total urban income per capita from 1978 to 1988. Some reduction of inequality in the upper tail plus some increase in the lower tail of the urban distribution are revealed by the simultaneous decrease in the Transformed Coefficient of Variation and the increase in the mean log deviation index. After 1988, urban inequality deteriorates significantly as indicated by the entropy indexes and the Gini coefficient, as well.[4] From 1978 to 1988, rural income inequality behaves almost identically to urban: the Gini and the Theil deteriorate a little, and the lower and upper tail inequalities show a corresponding rise and decline. However, from 1988 to 1995, rural inequality follows the opposite path to urban inequality and shows clear improvements under any inequality index shown in Table 1[5].

Although *within* inequality continues to be the main source of income distribution changes in urban and rural areas, *between* inequality levels shows an increasing role thanks to sluggish rural income. While urban income nearly doubled from 1978 to 1995, rural income only increased by 51 percent,

[4]This is precisely the trend found by previous studies that examine the changes in urban income inequality. For example, Núñez and Sánchez (1998a) find a decrease in the Gini coefficient from 0.47 in 1976 to 0.41 in 1982 and an increase to 0.48 in 1995. Similarly, Núñez and Sánchez (1998b) find a decrease in the variance of the log wage from 0.65 in 1976 to 0.59 in 1986 and an increase to 0.64 in 1996. See Ocampo *et al* (1998) as well.

[5] Despite income inequality fluctuations, social welfare in urban Colombia improved substantially and unambiguously from 1978 to 1988 and from 1988 to 1995. In rural areas, welfare improvements are also unambiguous between 1978 and 1988, but somewhat ambiguous between 1988 and 1995. Vélez, *et al* (2001) find first order stochastic dominance in both periods in urban areas, and during the first period in rural areas as well. However, from 1988 to 1995 in rural areas, second order stochastic dominance is only satisfied up to the 90th percentile.

and, as a result, *between* income inequality increased by 40 to 60 percent during that period.[6] Despite the increasing importance of between inequality, our calculations indicate that *within* remains the most important indicator to explain inequality at the national level. For this reason and since the dynamics of urban and rural inequality tend to diverge during the period of analysis, this paper divides the problem in two parts by analyzing separately the micro-dynamics of urban and rural inequality.

In urban and rural areas, inequality of earnings among *all individual workers* follows a somewhat similar pattern to *household* inequality (by household income per capita). Data from 1978 to 1988 reveal a pronounced fall in inequality for all individual *urban* workers (Table 6) and a very slight reduction for wage earners and the self-employed (Tables A.1.A to A.1.C). Yet all inequality indicators increased in 1995. Further examination *within occupational groups* categorized by *gender* reveals that all income inequality measures of self-employed and wage-earning men follow a similar pattern, but not among female workers, who reveal an upward inequality trend for both sub-periods.[7] Differences in average earnings across occupational groups fall substantially during the first sub-period but increase during the second, with the exception of self employed women who keep catching up with the other three groups. Reduction in gender differentials are responsible for most of the gain from 1978 to 1988, they remain nearly flat after that point.[8] From 1978 to 1988, *rural* inequality of individual earning rises slightly only to fall significantly after 1988 (Table 6). Inequality dynamics by gender within specific occupational groups reveals a divergent pattern: for females, inequality increases during the 1978-1988 period and improves after 1988 and for males, it falls during both sub-periods.

1.2 Main forces driving the dynamics of income distribution

The purpose of this paper is to identify the forces that shaped the changes of income inequality within urban and rural areas during the 1980s and early 1990s. Before turning to a detailed analysis of them, we first review the social and demographic developments that may have affected the distribution of income directly, or through the supply of labor. In addition, we will sum up the simultaneous structural reforms and macroeconomic events that had a major impact on the performance of labor market demand.

1.2.1 The Evolution of the socio-demographic structure of the working population

Higher and more egalitarian school attainment

[6]Depending on the inequality measure selected.

[7] Inequality is the highest for self-employed males, followed by self-employed females, male wage earners and female wage earners.

[8]From 1978 to 1988, average annual growth of real earnings for women was 2.0%, while for men was only 0.8%. Ranking by average earnings from top to bottom is as follows: male self-employed, male wage earner, female wage earner and female self employed. In 1988, corresponding relative earnings are 1.2: 1: 0.8: 0.7.

Urban educational attainment becomes higher and more egalitarian throughout the period. The proportion of urban workers with complete primary education or less fell by nearly 20 percentage points (!). Additional skill endowments emerged mainly as a result of a rise in the percentage of individuals with complete secondary schooling (13 percentage points) and complete or incomplete higher education (7 percentage points). Moreover, additional information by cohorts shows that the increase in educational attainment was greater among women, specifically among younger women who either caught up or surpassed men. Moreover, Colombian men and women have attained higher average levels of schooling with less inequality between them. Our calculations show that, on average, the 1975 cohort attained almost complete secondary schooling, 4 years above the schooling achieved by the cohort born 4 decades earlier. Further, the inequality of education within those two cohorts – measured by the coefficient of variation - fell by more than half during the same period.[9] Finally, the urban labor force is becoming more experienced and workers between 25 and 44 years of age represented 57 percent of the labor force in 1995.

Although the rural working population is becoming more experienced and better educated, it is comparatively younger and less educated, when compared to urban workers. In fact the demographic profile of the rural labor force in 1995 is somewhat similar –a little behind- that of urban areas in 1978. Average schooling figures improved across the board, especially for females. Nevertheless, compared to urban areas, the educational profile of the working population looks much more underdeveloped than the demographic profile does. Simultaneously, inequality of educational endowments fell within the rural population.[10]

Higher labor force participation –particularly among women.

Changes in labor market participation in urban areas have also been substantial, especially among women. During this period, the percent of the population not active in the labor market fell by 8 percentage points. Table 3 shows that the average employment rate for men in urban areas remained virtually constant – at around 90 percent -, while for women it increased from 37 percent to 51 percent. Consequently, the share of females in the urban working population has grown from 39 percent in 1978 to 43 percent in 1995. Over all the share of wage earners in the labor force remained relatively constant at around 44 percent. However, the proportion of men employed as wage earners is decreasing, while working females have entered the labor market as both wage earners and as self-employed participants. Most of the gain in labor force participation was among *female household heads or spouses*, and their proportion as wage earners increased by nearly 10

[9]From 0.75 to 0.33.

[10]In fact, the coefficient of variation of years of schooling for employed individuals changed from 0.98 in 1978 to 0.83 in 1988 and 0.77 in 1995.

percent over the years.[11] Finally, the female unemployment rate has traditionally been higher than that of males by an average of 4 or 5 percentage points and, in 1988, the unemployment rate was approximately 2 points above the levels registered in 1978 and 1995.

Although the rural labor market featured some similarities to the urban case, the level of participation is less intense. The share of women within the working population increased because the rate of employment for men remained practically unchanged - but lower than urban, between 76 and 79 percent-, while the same rate for women increased significantly -from 20 to 30 percent-. In contrast to urban areas, the new active labor force went more into wage-earning jobs than into self-employment activities. And within rural areas, a large proportion of women gained employment in the service sector by filling positions in commerce, finance and public services (López, 1998).

Decreasing fertility rates

Table 2 shows that family size fell in urban areas from 5.1 persons in 1978 to 4.3 in 1988 and 4.1 in 1995. For the average household, this change in size produced an increase in per capita income of 24 percent (!). This represents a fourth of the total gain *in real earning per capita* for the average Colombian household over the period. Moreover, the number of children per family -below 12 years of age- fell from 1.3 in 1978 to 1.0 in 1988 and 0.9 in 1995. Poor urban households tend to have less educated heads and spouses, who in turn have larger than average families (Figure 1 and Table A.4.B). Although the reduction in family size over the last two decades affects all income groups, differences between them persist.[12] A similar trend but with a faster pace occurred in the rural areas.

[11] The share of spouses within the active labor force jumped by 7 percentage points (!). This is partially explained by the increasing proportion of individuals that are either household heads –male or female- or spouses. By a total of 5 percent distributed as 2 percent, 1 percent and 2 percent respectively.

[12]For example, the differences in household size between the second and ninth decile in urban households are 1.2, 1.4 and 1.2 in 1978, 1988 and 1995, respectively. Therefore, the rate at which household size decreased remained relatively constant across income groups. Calculations based on model estimates (Table A.4.B) show significant differences in the number of children between parents with incomplete primary school or less and others with higher school attainment. The

Table 2. *Changes in Socio-Demographic Characteristics*
(Percentage)

	Urban			*Rural*		
	1978	*1988*	*1995*	*1978*	*1988*	*1995*
Age structure of the population in working age						
12-24	34.9	28.4	23.7	47.2	44.6	40.5
25-34	27.4	32.7	32.7	18.4	20.7	22.1
35-44	18.5	20.9	24.3	15.0	15.8	16.8
45-65	19.1	18	19.2	19.4	18.9	20.6
Education structure (labor force)						
Illiteracy	4.2	2.1	2.1	37.9	22.1	19.8
Primary	43.6	32.8	26.8	54.3	60.5	57.8
Incomplete Secundary	28.9	28.8	27.4	6.6	13.0	15.8
Complete Secundary	11.2	19.8	24.9	1.0	3.6	5.3
Incomplete Superior	6.3	7.1	8	0.1	0.5	0.8
Complete Superior	5.8	9.5	10.8	0.1	0.3	0.6
Total	100	100	100	100	100	100
Average years of education	6.4	7.9	8.9	2.1	3.4	3.9
Household size	5.1	4.3	4.1	5.9	5.1	4.7

Source: DANE, Encuesta Nacional de Hogares. Authors' calculations.

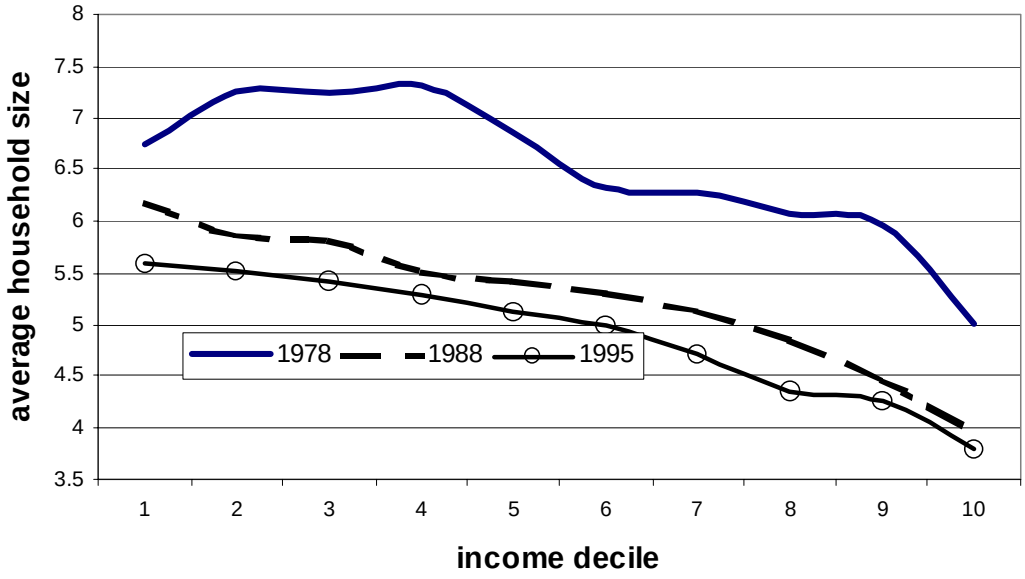
Table 3. *Labor Market Indicators*
(Percentage)

	Urban								
	1978			*1988*			*1995*		
	Male	*Female*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*	*Total*
Labor Market Statistics									
Average employment rate	88.9	37.0	62.4	88.6	43.3	64.4	90.4	51.0	69.2
Employed by gender	61.4	38.6	100	58.7	41.3	100	56.6	43.4	100
Unemployment rate	6.9	10.3	8.2	7.8	13.9	10.3	6.8	11.4	8.8
Working Population by Groups									
Percentage of wage earner	64.2	25.6	43.5	59.7	28.9	43.3	56.3	32.8	43.7
Percentage of self employed	24.0	10.0	16.5	28.3	12.6	19.9	33.4	16.3	24.2
Inactive	11.9	64.4	40.1	12.0	58.5	36.8	10.3	50.9	32.1
Total	100	100	100	100	100	100	100	100	100
Average earnings per month (Th.Col$1995)	239	150	211	253	182	228	296	206	261
Average wages per hour (Th.Col$1995)	1.3	0.8		1.2	0.9		1.5	1.2	
	Rural								
	1978			*1988*			*1995*		
	Male	*Female*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*	*Total*
Labor Market Statistics									
Average employment Rate	76.8	19.6	49.1	79.0	26.5	53.0	76.1	29.6	53.1
Emplyed by gender	81.4	18.6	100.0	75.6	24.4	100.0	72.5	27.50	100.0
Unemployment rate	1.3	5.4	2.1	2.3	8.9	4.0	2.6	9.70	4.7
Working Population by Groups									
Percentage of wage earner	46.5	7.6	26.7	47.9	13.7	30.6	46.9	16.5	31.7
Percentage of self employed	26.4	8.2	17.1	27.2	10.1	18.5	26.0	12.5	19.3
Inactive	27.1	84.2	56.2	24.9	76.2	50.9	27.1	71.1	49.1
Total	100	100	100	100	100	100	100	100	100
Average earnings per month (TCol$1995)	106	68	99	118	86	111	115	86	107

Source: DANE, Encuesta Nacional de Hogares. Authors calculations.

differences are 1.3, 1.0 and 0.7 for the three years of the study. However, that gap is almost negligible for education levels above high school.

Figure 1. Average household size by income decile. Urban Colombia 1978, 1988 and 1995.



Gender differentials narrowed and skill premia fluctuated.

Although real earnings increased collectively among men, women, wage earners and the self-employed, the considerable increase in women's real earnings, relative to their male counterparts, narrowed the gender gap (Table 3). During the 1978-88 period, significant increases in wages of workers with primary education or less caused reductions in skill premia among men. However, in the subsequent period -1988-95- this trend began to reverse at the top tail of the skill distribution, due to the rise of college graduates' wages relative to high school graduates'. Overall, from 1978 to 1995, the wage differential contracted, especially for people with completed tertiary education or less. Due to the relative wage increase for all female workers with post-primary education levels, gender-earning differential fell substantially over the period. A similar trend for the gender gap and skill premia is apparent in rural areas.

1.2.1 Macro events and changes in demand for labor

Satisfactory growth performance, but declining elasticity of employment to GDP

Although the growth performance of the Colombian economy was satisfactory between 1978 and 1995, the elasticity of urban employment to GDP declined as the growth rate picked up in the early 1990s. The country's GDP per capita grew at an average annual rate of 1.8 percent, with very low instability.[13] Economic growth was higher during the second sub-period: on average GDP growth

[13]A standard deviation of 0.02%. Moreover, a cross-country study by Rodrik (1999) shows that the probability of the Colombian economy entering episodes of "high volatility" in the last thirty years was close to zero.

rate went from 3.3 in 1978-88 to 4.3 percent in 1988-95.[14] However, labor demand response was less intense, and on that account employment growth fell from 5.2 to 3.2 percent, for the corresponding sub-periods.

Increasing difficulties for low skill job creation in the 1990s

Lower elasticity of job creation relative to growth should be associated with weaker labor demand – although not exclusively- Several macro-events and structural reforms during the early 1990s are linked to lower dynamism of labor demand for less skilled workers: (i) an exchange rate appreciation and labor legislation reforms in the early 1990s that increased the relative cost of labor relative to capital and made job creation for less skilled workers more difficult; (ii) a tendency of domestic industry to invest in more capital intensive technology, as exposure to international competition rose due to tariff reductions and regional trade integration; (iii) a gradual re-composition of productive activities towards more capital intensive activities, as production shifted from agriculture and industry to mining and services, and (iv) increasing corporate tax rates during the early 1990s. Only one factor helped to reinforce the demand for low-skilled labor: the five-fold increase in construction activity in the early 1990s, closely related to exchange rate appreciation, which derived from unprecedented capital inflows that increased the relative price of non-tradables to tradables.[15]

Rising costs of wage-earning job creation relative to self-employment

The substantial rise in payroll taxation also made the generation of wage-earning jobs increasingly difficult, *vis-à-vis* self-employment. In fact, during the 1988-95 sub-period the loss of job creation dynamism was mostly concentrated in wage earners and less in self-employment. Between 1978 and 1988, the rate of growth of self-employment jobs was 1.5 times the same rate for wage earners; however from 1988 to 1995, the former rate becomes twice (!) the latter. Although the labor reform of 1990 (Ley 50) somewhat reduced labor costs by diminishing the expected value and the risk of cost of dismissal -"cesantías"-, subsequent labor legislation reforms produced the opposite effect. The reform of social security regimes, including health insurance and pensions (Ley 100 de 1993), resulted in an almost doubling of payroll contributions (!) and produced a substantial increase in the labor cost gap between wage earner and self-employed workers.[16]

[14]Nevertheless, cycles were not completely absent and the economy went through a moderate recessive period during the first half of the 1980s. In the second half of the 1980s, macroeconomic policy kept a competitive exchange rate and a moderate public deficit. Interest rates fell and some trade restrictions were lifted. Non-traditional exports grew at a high pace. After a low level of activity in 1991, the economy recovered once again in 1994 and 1995.

[15]In addition to the liberation of the capital account in 1993, the economy suffered supply shocks derived from major discoveries of oil reserves, which resulted in a jump in oil exports revenues and expectations of exchange rate appreciation in the second half of the 1990s. See Cardenas and Vélez (1997)

[16]Payroll contributions increased 13 percentage points (!) – up to 13.5 percent for pensions and 12 percent for health insurance. And that was on top of preexisting payroll taxes of 9 percent, earmarked for labor training, and social welfare

Negative shocks and adverse policies in early 1990s reduce agricultural output and encourage more labor-intensive crops

During the first half of the 1990s, agriculture was simultaneously hit by a collection of negative circumstances and policy measures that produced a major reduction in output. The removal of import controls, the reduction of tariff protection, exchange rate appreciation, low international prices, scarce credit, frequent drought and increasing violence all contributed to agricultural decline (Jaramillo, 1998). Although partial protection of agriculture was reestablished in 1995, land and capital intensive transitory crops were abandoned (e.g. cotton, corn, sorghum, soy) in favor of more labor intensive permanent crops (e.g. oil palm, fruits, sugar cane).

Rural credit and land concentration: two distinct phases

During the period under review, rural credit and land ownership went through two different phases: initial concentration and final de-concentration. Between 1974 and 1984, there was an increase in the concentration of land ownership (Lorente et al., 1994); however, when taking into account the value of the land between 1985 and 1996, the distribution improved from a Gini coefficient of 0.61 to 0.59.[17] Between 1974 and 1984, interest rate subsidies and agricultural credit rationing were concentrated resources among large-scale producers. A shift occurred between 1984 and 1993 - the controls over interest rates gradually crumbled and credit had a tendency to de-concentrate (Gutiérrez, 1995).

In summary, the urban population gained experience, became more educated, increased its labor force participation and reduced its fertility rate throughout the entire period. Male heads' and other households members of began to shift from wage-employment to self-employment, especially between 1988 and 1995.

2. The determinants of household income: 1978, 1988 and 1995

In order to explain the dynamics of income distribution we first need a representation of income generating behavior. We model household income as the outcome of two interrelated process: (i) the generation of labor earnings as a function of observed and unobserved characteristics of the individual and the corresponding market prices for those characterisitics and (ii) the individual decisions to participate in labor activities *vis-à-vis* other non-market activities –such as household work or studying, etc.- as a function of potential benefits of alternative occupational choices and in relation to the characteristics of the household and the individual.[18] This section presents the main results of the estimation of the earnings and occupational choice equations, and highlights the most

programs. In summary, including remunerated annual leave and *prima semestral*, the reforms of 1993 lifted total payroll contributions to 59.4 percent for regular workers.

[17]Nevertheless, international comparisons show that the concentration of land in Colombia in the early 1990s was inferior to that in Czechoslovakia, Brazil, Paraguay, Argentina and Panama (Deininger and Squire, 1998).

[18]For detailed model specificaton, see Bourguignon, Ferreira and Lustig (2000).

prominent changes in underlying individual or market behavior that should bring about changes in the distribution of income from 1978 to 1995.

Urban and rural incomes are modeled independently. Four separate Mincerean earning equations are estimated for self-employed and wage-earning workers divided by gender. Explanatory variables are schooling, potential labor experience and location. Both education and experience include quadratic terms to control for heterogeneity in returns by levels of schooling. In the *urban* case, male's equations are estimated by OLS, while females' are corrected for selection bias with the Two Stage Heckman correction. For *rural* areas, the Heckman correction is applied to wage earners for both gender groups and OLS is used for the self-employed.

Participation and occupational choice behavior is estimated as a multinomial logit model with three possible labor states: 1) self-employed, 2) wage earner and 3) labor inactive. Within the *urban* household, participation and occupational behavior modeling is applied to individuals of working age divided into *three* separate groups, according to their relative position within the family: household heads, spouses and other members of the household –dummies for gender are included in each case-. In *rural* areas, all individuals of working age are clustered into one group. Participation models are in reduced form and do not include income or wage variables, therefore participation depends on socio-demographic characteristics of the individual and his/her household. Explanatory variables included indicate the potential household welfare gains -or losses- associated with each occupational choice. First of all, the variables that affect the potential earnings of the individual are already included in the earning equation –schooling, experience, region and gender. Second, the capacity to generate labor income by all other members of the household is represented by their endowment of human capital –average schooling, experience-. And thirdly, the presence of children or dependent adults (which may raise the value of time spent at home), or the presence of another adult (which may become alternative provider of home care to dependent members) determine the value of time in household activities; therefore, a vector describing the complete demographic structure of the household -distinguished by age and gender- is included.

2.1 Changes in the earnings equations

The four panels of Table 4.A present the results of *urban* individual log earnings regressions on schooling, experience and regional dummies for male wage earners and self-employed men and women. The two bottom panels show the results from the Heckit regressions for wage-earning and self-employed women. For all periods and for all occupational choices, parameter estimates have the expected signs and are significant for the relevant variables. Most parameter estimates on key explanatory variables are significant at 1% level, and goodness of fit is satisfactory -R^2's are 0.4 or better for the urban wage earners, and close to 0.3 for self-employed males. The positive estimate of

the quadratic term on education reveals that rates of return *increase* with schooling within all groups. For example, in 1995 a male wage earner with primary schooling obtained only a 3.7 percent return per year of schooling, while male college graduates reached rewarding returns of 19 percent or more. Similar results where found for the estimates of individual earnings in rural areas (Table 4.B).

Table 4a. Earnings Equations of Wage and Self-Employed Male and Female Urban Workers: 1978, 1988, and 1995.

Variable	*1978*	*1988*	*1995*	*1978*	*1988*	*1995*
	Male Wage Earners (OLS)			*Male Self-employed (OLS)*		
Constant	9.0234 *	9.5537 *	9.8234 *	8.4609 *	8.9284 *	9.3611 *
Schooling	0.0474 *	0.0027	-0.0379 *	0.1232 *	0.0901 *	0.0321 *
Schooling²	0.0046 *	0.0055 *	0.0075 *	0.0007	0.0024 *	0.0051 *
Experience	0.0727 *	0.0541 *	0.0476 *	0.0867 *	0.0561 *	0.0536 *
Experience²	-0.0011 *	-0.0007 *	-0.0007 *	-0.0013 *	-0.0007 *	-0.0007 *
Residual Variance	0.5142	0.457	0.5211	0.885	0.7913	0.8156
No. of Observations	2,234	9762	8,534	834	4,635	5,059
R^2	0.4774	0.4659	0.3983	0.2818	0.3216	0.3029
	Female Wage Earners (Heckman Correction)			*Female Self-employed (Heckman Correction)*		
Constant	9.2313 *	9.3672 *	9.4141 *	8.2978 *	8.3962 *	8.8958 *
Schooling	0.0267 †	0.0383 *	-0.0015	0.0361	0.0457 **	0.0254
Schooling²	0.0049 *	0.0034 *	0.0062 *	0.0068 **	0.0063 *	0.0061 *
Experience	0.0399 *	0.0416 *	0.0337 *	0.0342 **	0.0461 *	0.0448 *
Experience²	-0.0007 *	-0.0006 *	-0.0006 *	-0.0004 †	-0.0006 *	-0.0006 *
Residual Variance	0.4587	0.458	0.4934	0.8905	0.9159	0.9127
No. of Observations	4046	18676	17,621	4,046	18,676	11,837
Chi(2)	774 *	3229 *	3,082 *	201 *	792 *	844 *

Note : Regional Dummies are omitted from the table. * Indicates significance at the 1% level or better, ** indicates significance at the 5% level, and † indicates significance at the 10% level.

Source: DANE, Encuesta Nacional de Hogares. Authors calculations

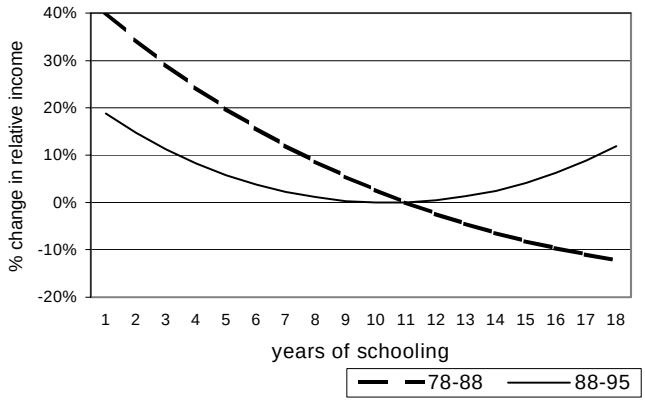
Table 4b. Earnings Equations of Wage and Self-Employed Male and Female Rural Workers: 1978, 1988, and 1995.

Variable	*1978*	*1988*	*1995*	*1978*	*1988*	*1995*
	Male Wage Earners (Heckman Correction)			*Male Self-employed (OLS)*		
Constant	10.0117 *	10.4208 *	10.7522 *	10.2176 *	9.2593 *	9.2058 *
School	0.0310 *	0.0221 *	-0.0050	0.0432 *	0.0749 *	0.0738 *
School^2	0.0032 *	0.0021 *	0.0042 *	0.0054 *	0.0005	-0.0005
Age	0.0703 *	0.0668 *	0.0474 *	0.0463 *	0.0656 *	0.0730 *
Age^2	-0.0009 *	-0.0008 *	-0.0005 *	-0.0005 *	-0.0006 *	-0.0007 *
Atlantic	0.1441 *	-0.3041 *	-0.2729 *	0.043864	-0.0335	-0.0317
Oriental	-0.2613 *	-0.2324 *	-0.0454 *	-0.5813 *	-0.2765 *	-0.2297 *
Central	-0.3120 *	-0.2345 *	-0.2016 *	-0.6479 *	0.0583	-0.2490 *
Model Chi^2	383.7	1237.2	1970.0	_	_	_
Adj. R^2	_	_	_	0.1780	0.1243	0.1180
No. observations	2987	4438	4691	1692	2515	2604
	Female Wage Earners (Heckman Correction)			*Female Self-employed (OLS)*		
Constant	10.3933 *	9.8676 *	10.0758 *	11.1366 *	10.5254 *	10.0828 *
School	0.0412	0.0800 *	0.0527 *	0.0067	0.0636 *	0.0647 *
School^2	0.0050 *	0.0015	0.0021 *	0.0097 *	0.0014	0.0035 *
Age	0.0233 *	0.0576 *	0.0508 *	-0.0026	0.0040	0.0186 *
Age^2	-0.0003 *	-0.0005 *	-0.0005 *	0.0000	0.0000	-0.0001
Atlantic	0.0401	-0.2306 *	-0.1884 *	0.5326 *	-0.1274	0.1923 *
Oriental	-0.0579	-0.1947 *	-0.0025	-0.0263	-0.5907 *	-0.0297
Central	-0.1639 *	-0.1825 *	-0.1305 *	0.0143	-0.1065	-0.0722
Model Chi^2	_	_	_	446.4	1028.6	1081.3
Adj. R^2	0.3295	0.4211	0.3877	_	_	_
No. observations	505	1300	1645	546	965	1246

* Significant at 5% level

Source: DANE, Encuesta Nacional de Hogares. Authors'

Figure 2.A and 2.B Change in income from changes of returns to education, relative to workers with complete secondary education. Male and female wage earners. Urban Colombia. From 1978 to 1988 and from 1988 to 1995.



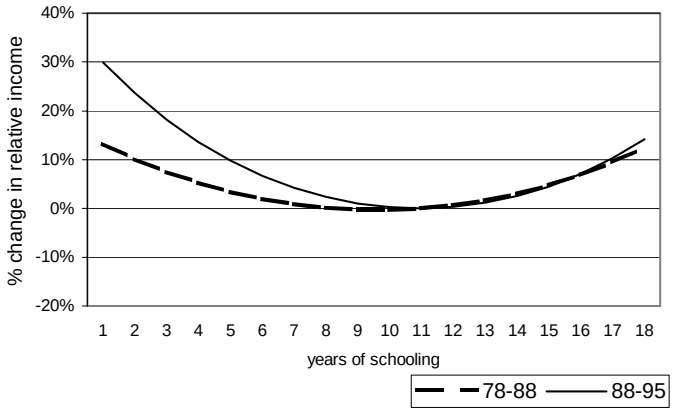
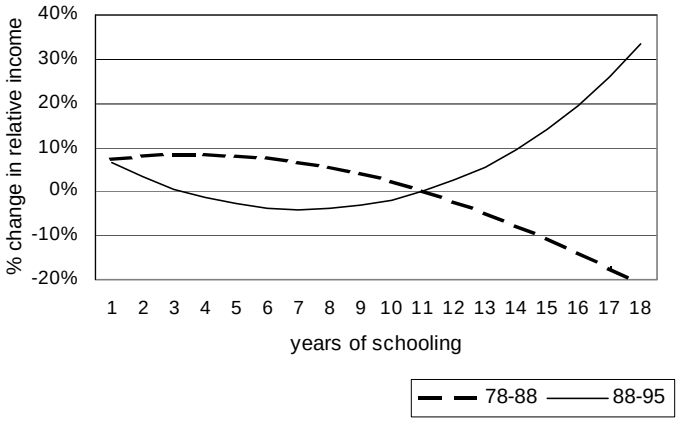
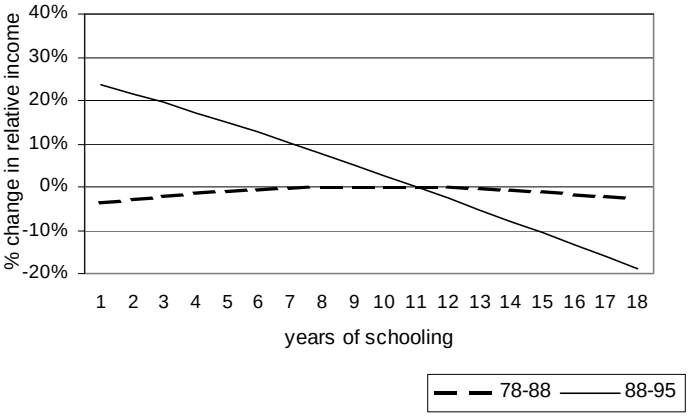


Figure 2.C and 2.D Change in income from changes of returns to education, relative to workers with complete secondary education. Male and female self-employed. Urban Colombia. From 1978 to 1988 and from 1988 to 1995.





Increasing heterogeneity in returns to education and more convexity of the earnings function

Over the years, rates of return to education by level of school attainment fluctuate and produce abrupt changes in the convexity of the earnings function and in wage skill premium. Figures 1.A to 1.D show how the changes in parameter estimates for schooling affect wage differentials for *urban* males and females within wage and self-employment sectors.[19] The convexity of earnings with respect to years of education decreased for all workers between 1978 and 1988, except for self-employed women. Figures 1.A shows that the relative earnings of less educated wage-earning men increase substantially more than the earnings of wage earners with college education in the 1978-88 period. The relative wage of individuals with incomplete primary education increased by more that 40 percent relative to college graduates. Similar changes are observed in Figures 2.B and 2.C. As a result, the relative earnings of college graduates to workers with completed primary education fell from 4.9 to 3.7 among male wage earners, from 4.2 to 3.3 among female wage earners, and from 7.2 to 7.1 among self-employed women in the 1980s. In contrast, from 1988 to 1995, the convexity of earnings decreased for the lower tail of the skill distribution –high school drop outs or less- and increased in the upper tail –mainly for college graduates. The only exception was self-employed females who experienced a reduction in convexity for all levels of schooling.

Compared to the urban labor market, returns to education in rural areas behave similarly, but offered a more heterogeneous evolution over time and across labor groups (Table 4.B). Returns to education tend to increase with school attainment, except for self-employed males in 1988 and 1995. Just as in the urban case, the convexity of the earnings equation decreases from 1978 to 1988 and increases in the following period. In contrast to urban areas, rates of return to education in the rural sector tend to fall not only for less skilled workers, but also for individuals with complete or incomplete college education.[20]

Residual variance fluctuates

Residual variance represents the variability of a joint measure of rewards to unobserved skills, measurement error and transitory components of income.[21] Table 4.A shows a reduction in residual variance between 1978 and 1988 and an increase between 1988 and 1995 for all groups, except for self-employed women for whom the variance increased in both periods.

[19]In the vertical axis, the graph has the percentage change in earnings of any worker *in excess* of the percentage change in earnings experienced by a worker with complete secondary education – 11 years of schooling. Therefore, the variable in the vertical axes represents the rate of change in *relative* earnings of a worker for every education level. Notice, that since the reference level is secondary schooling, its rate of change is always zero.

[20] During the period of analysis, there has been a relative stagnation of productivity and/or adoption of new technologies in agricultural activities.

[21] In particular, changes in the variance may also reflect changes in working time, changes in the wage differentials between firms or changes in the relative rents among more disaggregated sectors (e.g., due to deregulation or due to changes in union and non-union wage differentials).

Earning differentials: tend to fall by gender and fluctuate by occupational group

Shifts in the constant term of the Mincerian equations, from 1978 and 1988, reduce earning differentials by gender and occupational groups. Relative earning of female workers –self-employed in particular- improve *relative to* male wage earners, while self-employed males –the highest relative average earning of all four groups- lost 9 percentage points. From 1988 to 1995, average real incomes among occupational groups become increasingly differentiated, except for self-employed females.

Moderate changes in returns to potential experience and regional differentials

Experience differentials are smaller and less concave for all groups during the study period. With the exception of self-employed woman, earnings to experience became less tilted and less concave[22] and regional differences decline for all groups between 1978 and 1988, but do the opposite during the 1990s.[23]

2.2 Changes in Participation and Occupational Choice Behavior

Urban

Table 5 and Figure 3 show the estimated marginal effects of selected variables in the multinomial model of participation and occupational choice between wage earners, the self-employed and the inactive in 1978, 1988 and 1995. Participation in the labor market displays the regular features. Higher levels of education increase the probability of being employed, in particular for spouses.[24] Participation decreases with experience –age- for household heads and spouses, but increases with the same variable for other workers. Spouses participation is particularly sensitive to demographics and exogenous income: it falls with the number of children in the household and with the "exogenous" income of the family, measured by the average human capital endowment –education and experience- of other members.[25]

Changes in parameter estimates produce shifts and tilts of the participation schedules. From 1978 to 1988, changes in participation relative to education are not homogeneous across occupational groups. While male household heads have maintained their level of participation, spouses and female heads are becoming relatively more active. Among other male workers, participation shifted downwards mostly among the less educated. Something similar happened among female household heads, with a complementary increase in favor of the more skilled. Among married women participation tilted the opposite way, favoring the less educated (Figure 3). Finally, other female

[22] The coefficients on experience and the quadratic of experience decreased in absolute value for both wage earners and self-employed men, but the changes were stronger between 1988 and 1995.

[23] The difference between the largest regional premium and the largest regional penalty declined throughout the period for male and female wage earners and for self-employed men. For example, the difference decreased from 10.9 and 16.3 percent between 1978 and 1988 to 4.4 and 2.7 percent from 1988 to 1995 for male and female wage earners.

[24] Except for household heads -who have homogenous employment above 98 percent.

workers saw a reduction in participation that affected the highly skilled a bit more. From 1988 to 1995, we observe a significant rise in participation for all women with increasing benefits for the less skilled among spouses and other female workers –skill neutral among female heads-. Other male workers also saw a tilt in favor of less skilled workers. In both sub-periods, changes in participation among household heads are negligible.

[25] 17% drop in participation in 1978, between primary and college graduate average education

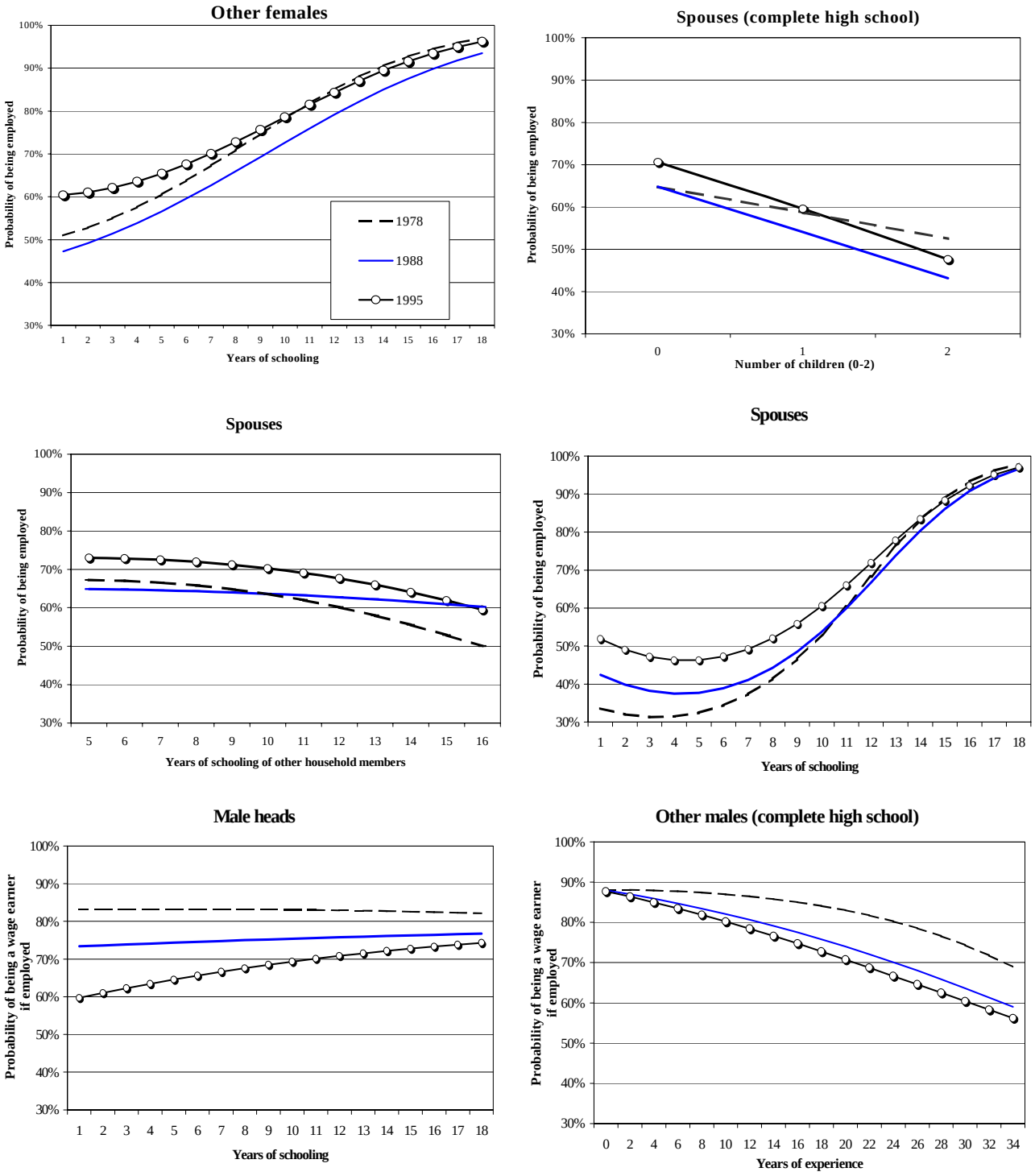
Table 5. Marginal Effect of Selected Variables on Occupational Choice among Wage Ea
Inactive. For Urban Heads, Spouses and Other members of the household, and All Rura
1995.

Variabl	*1978*	*1988*	*1995*	*1978*	*1988*	*19*
			Urban Household			
	Self-			*Inactive*		
Consta	-	-	-	-	-	-
Schoolin	-	-	-	0.2	-	
Experien	1.2	0.9	0.7	0.0	0.1	
Gender	-	-	-	15.6	12.8	
Children <	4.1	0.8	-	-	-	
Children 2-	1.7	0.9	1.1	0.1	-	
Children 6-	0.9	0.8	2.6	-	-	
No.	2587	1265	1210	2587	1265	
Pseudo^2	0.181	0.141	0.136	0.181	0.141	
			Urban			
	Self-			*Inactive*		
Consta	-	-	-	23.6	28.2	
Schoolin	0.3	0.7	0.7	-	-	
Experien	0.2	0.3	0.3	0.0	-	
Children <	-	-	-	4.8	7.9	
Children 2-	-	0.4	-	2.4	2.1	
Children 6-	-	0.2	1.8	1.3	0.8	
No.	1931	9586	9233	1931	9586	
Pseudo^2	0.090	0.090	0.089	0.090	0.090	
			Urban			
	Self-			*Inactive*		
Consta	-	-	-	-	3.4	
Schoolin	0.0	0.2	0.0	-	-	
Experien	0.4	0.5	0.6	-	-	
Gender	-	-	-	34.5	28.5	
Female * Children	-	-	-	17.3	15.1	
Female * Children	6.1	-	0.5	-	5.2	
Female * Children	-	0.7	0.4	4.2	1.6	
No.	3009	1278	1143	3009	1278	
Pseudo^2	0.143	0.118	0.121	0.143	0.118	
			All Rural			
	Wage			*Inactive*		
Schoolin	0.9	0.4	0.7	-	-	
Age	1.4	1.0	0.8	-	-	
No.	1308	1878	1999	1308	1878	
Pseudo^2	0.39	0.341	0.327	0.39	0.341	

Note: The excluded categories are Wage Earners for Urban and Self-employed for Rural. Significance indicators of Multinomial Log
level, ** at the 5% level, and at the 10% level. Some variables used in the model are not included in the table. Urban: Average educ. l
average yrs. of experience, no. of other males between 14 & 65 yrs. old, no. of other females between 14 & 65 yrs. old, no. of other males ol
no. of other females older than 65 Rural: Pop. less than 2 yrs old, pop. between 3 & 5 yrs. old, pop. between 6 & 9 yrs. old, male betwee
old, female between 18 & 66 yrs. old, male older than 65, female older than 65, average educ. level of household, average age of hou
dummies, female, household head, and spouse. indicates both with and without female dummy; female dummies were not included in t
model.

Source: DANE, Encuesta Nacional de Hogares. Authors' calculations

Figure 3. Probability of being employed or wage earner according to individual level of education, number of children, human capital of other members.: Household Heads, Spouses and Other. Urban Colombia, 1978, 1988 and 1995.



Simultaneously, the negative impact of infants on female labor force participation was shifting over the years and ended up concentrating its power among spouses with very young kids (Table 5 and Figure 3). From 1978 to 1988, married women with young children -less than two years of age- almost doubled their marginal probability of being out of the labor force.[26] Concurrently, the effect of children 3-5 remained constant –close to minus 10% for two kids-, while for children 6 to 13, it was half that level in 1978 and dissipated gradually and became zero in 1995. The effect of exogenous income on spouses' participation shows powerful shifts over the years. From 1978 to 1988, this effect became weaker –only 5 percent- and tilted in favor of families with higher human capital endowments. However, in the subsequent period, it almost returned to its original value, favoring households with middle and low levels of human capital endowments.

Occupational choice presents the standard characteristics as well. Wage employment opportunities are more likely for younger and more educated individuals. Differentials in education are particularly relevant for employment opportunities among spouses and other workers.[27] The education gradient for on wage-earning household heads becomes positive and significant in 1995[28], although it was negligible in 1978. The probability of self-employment increases with experience, especially for household heads and other workers -but not for spouses in 1995-.[29] Moreover, changes in the marginal effect of experience and education are heterogeneous across household members. For household heads, the gradient for experience remains constant -at approximately 20 percent in 32 years' difference-. After being nearly 7 percent in 1978 for spouses, the age gradient of almost disappeared since 1988. For other workers, the age effect has almost doubled over the years: it started at 14 percent in 1978 and it increased by 10 and 3 percentage points in the two subsequent periods.[30] In summary, behavioral changes (in parameters) from 1978 to 1995 indicate two things: first, all along males are moving away from wage earning jobs, while females during the 1978-88 period are doing the same in smaller proportions, but from 1988 to 1995 spouses and females heads go back into wage earning jobs in substantial numbers. Second, occupational choice is becoming more sensitive to differentials in age and education.[31]

Rural

In Table 5 (bottom panel) the sample mean of the marginal impact of years of education and the age of the individual on labor market participation are presented. They are based on estimates of a

[26] The marginal effect of 2 kids from 0 to 2 years old jumped from minus 12% to minus 22%.
[27] Sixteen years of schooling represent an increase of 20% in probability of being wage earner, given that is employed.
[28] 9 percent, which is similar to the effect on other workers.
[29] In 30 years it falls by 20% for household heads and by 27% for other males –1995-.
[30] All comparisons based on a 32 years difference of experience.

multinomial Logit model of three alternative states: self-employment -reference state-, inactivity or a wage-earning job. The explanatory variables in the model are the same as in the urban case, plus one indicator for the individual role within the household -i.e. head of household, spouse, other-. The main features of the rural model are similar to the urban. On average, labor market inactivity decreases with education and age, in every period: by more than 1 percent for each additional schooling grade and by almost 2 percent for each additional year of age (Table 5). Wage-earning activities tend to increase with school attainment, but contrary to the urban case age increased the chances of self-employment. However, there are some non-linearities involved and these marginal effects tend to vary with the level of the independent variable. While labor inactivity starts to decrease after age 41, wage earner participation as starts to drop 3 years earlier, and participation in self-employment declines at a much later age –between 47 to 52 years-. Less educated workers are more likely to be self-employed: the marginal impact of schooling becomes negative after completing primary school - in 1978- or after the first two years of secondary schooling in 1988 and 1995. Correspondingly, in 1978, the odds of becoming a wage earner always increased with schooling; however since 1988, the marginal effects of schooling are positive and larger only for individuals who have completed at least two years of primary schooling.

In summary, the main features of the evolution of model of individual earnings, participation and occupational choice are:

- A *reduction* in the convexity of earnings with respect to years of education for all workers during the 1980s, except for self-employed females, followed by *increase* in the convexity of earnings with respect to years of education for wage earners (especially women) during the 1990s.
- A fall in the dispersion of the rewards for unobserved skills of male workers between 1978 and 1988 and an increase in the dispersion of these rewards between 1988 and 1995 for all workers, except for self-employed women.
- An increase in participation in wage employment (a sector with less within group inequality) during the 1978 to 1988 period, and an increase in participation in self-employment (a sector with more within group inequality) during the period between 1988 and 1995.
- Moreover, the changes in within sector inequality have also been accompanied by a fall in earnings differentials by gender and between the wage and self-employment sectors during the 1980s, and a rise during the 1990s.

[31] Presumably, the main rational behind this gender asymmetric behavior in occupational choice is the social security reform (1993) that extended health insurance coverage to the whole family of the worker.

- Participation and occupational choice functions suffer significant tilts relative to education, experience, number of children, exogenous family income, et cetera. Ex-ante, their potential impact on income inequality appears ambiguous. Therefore, the following section uses simulations to isolates the effects of those changes.

3. Understanding Income Distribution Dynamics in Colombia: Factor Decomposition by Simulations, 1978-1988 and 1988-1995

We now move one step further and decompose the evolution of inequality by isolating its dynamic response to the changes in skill prices, in structural parameters of participation and occupational choice, and in skill endowments, over time. We follow the framework established in Bourguignon, Ferreira and Lustig (1999), the methodological paper that guides this cross-country project on dynamics of income inequality in Asia and Latin America.[32]

This section presents the results of the decomposition exercise on observed income distribution dynamics of both individual labor earnings and household per capita income in urban and rural areas for the periods 1978 to 1988 and 1988 to 1995. In urban areas, we start by decomposing the dynamics of the distribution of *individual* labor earnings linked to (i) changes in returns to observable human assets –education and experience- and regional location premiums; (ii) changes in the error variance of earnings equations, or returns to unobserved productive characteristics; and (iii) the structural changes in labor force participation and occupational choice.[33] Secondly, we decompose the remainder of unexplained changes in income inequality as endowment effects associated with changes in socio-demographic characteristics of the population. Among them we single out the paradoxical effect of educational endowment equalization. Finally, we consider the dynamic responses of *household* income inequality to the set of changes in the same determinant factors listed above and explain any potential divergence vis-à-vis the results at the individual level. In the household case, we also examine the evolution of inequality with respect to changes in family size.

3.1 Urban Areas: The Reversal of the Inequality trend by the Combination of Persistent and Fluctuating Forces

3.1.1 Individual Labor Earnings

During the 1978-88 period, income inequality among individual workers fell markedly by 3.1 points, from 47.8 to 44.7. Our exercise on inequality change decomposition allows us to identify

[32] The proposed decomposition framework is a dynamic extension of the Blinder-Oaxaca decomposition. In addition to isolating changes in the prices and quantities of observable skills, this decomposition also incorporates joint changes in the prices and quantities of unobservable skills as in Almeida dos Reis and Paes de Barros (1991) and Juhn, Murphy and Pierce (1993) and, identifies the contribution of participation and occupational choice decisions on the changes in earnings inequality.

four major equalizing forces partially counterbalanced by *two* unequalizing factors. The main equalizing factors are: (i) changes in returns to education; (ii) the lower variability of the error term on the male earnings equation; (iii) improvements in relative earnings between gender groups and self-employed *versus* wage earners –the constant term; and (iv) changes in returns to experience. The two unequalizing factors are (i) the change in educational endowments and (ii) the shift in labor force participation due to parameter changes in the occupational choice equations.[34] The aggregate equalizing play a dominant role.

Table 6. Decomposition Income Distribution Changes for Households and Individual Workers. Changes in the Gini coefficient. Urban and Rural Colombia (1978 - 1988, 1988 - 1995)

	Change Gini	*Returns*				*Participation*	*Error term*	*Endowments*			*Non-Labor Income*
		Education	*Experience*	*Regions*	*Constant*			*Total*	*Education*	*Family Size*	
					Urban						
1978-1988											
All Individual Workers	-3.1	-2.3	-0.7	0.0	-0.8	0.8	-2.4	2.3	3.0	-	-
Households	0.0	-1.9	0.1	0.1	-0.2	0.7	-1.5	2.4	2.3	-0.6	0.8
1988-1995											
All Individual Workers	5.5	0.0	-0.1	0.0	0.0	0.6	2.5	2.5	1.2	-	-
Households	4.2	-0.1	0.1	0.1	0.4	-0.4	1.1	2.9	0.8	-0.4	0.6
Persistent (P) and Fluctuating (F) Factors		F/P	P		F	P/F	F		P	P	P
					Rural						
1988-1995											
All Individual Workers	-2.4	-1.2	-1.3	-1.1	n.a	-0.9	-1.8	-0.4	-1.3	-	-
Households	-3.7	-0.1	0.1	-0.2	n.a	-0.4	-0.6	-	-0.4	-0.7	n.a.

Between 1988 and 1995, inequality increases as a result of multiple factors other than returns to human assets. Total urban inequality shows a sharp increase for individual workers (Tables 6 and A.1.E) and the Gini coefficient rises from 44.7 to 50.3,[35] completely erasing the gains in inequality experienced during the previous decade. Some of the determinant factors of inequality played a similar role during the second period. However, some others shifted to the opposite or a neutral effect and became dominant (Table 6). Essentially, most of the regressive tendency of this period is explained by three regressive forces: (i) the larger variance of the error term in the earnings

[33]The Appendix includes tables with disaggregated results within the four income earning groups in urban areas –wage earners and self employed, males and females.

[34]Despite these identifiable common factors, the differences in orders of magnitude of the specific equalizing and unequalizing forces -for each occupational group- produced divergent changes across gender groups. In fact, from 1978 to 1988 there is a reduction of inequality among the male workers, but a significant increase for the female workers.

[35] This decomposition at the individual level is also consistent with the profile established for the different groups of workers; in fact, during that period, both occupational male groups and female wage earners experience a significant rise in inequality (see Tables A.1.A-D in the Appendix). Simultaneously, however, self-employed females exhibit opposite inequality tendencies. Thus, the consistent behavior among male and female wage earners and their *larger* mass within the labor force provides the dominant effect observed at the aggregate level.

equation; (ii) the expansion and equalization of the education endowments of the working population; and (iii) the change in labor force participation and occupational choice.

Structural parameters of the earnings equation

Returns to education

Changes in returns to education -especially among wage earners- are a strong equalizing force and explain a reduction of 2.3 points of the total change in inequality for all workers from 1978 to 1988. The source of this change was the fall in wages of skilled workers relative to unskilled workers during this period.[36] From 1988 to 1995, changes in returns to education are neutral on the total change in inequality. However, this minor change in inequality disguises an important but counterbalancing adjustment at both tails of the schooling range. Simultaneous with the rise in wage premiums for college graduates relative to those with only secondary education, the wages of the less educated were increasing as they were being pulled by additional labor demand resulting from the real estate construction boom.[37]

Residual Variance

Fluctuations in residual variance produced the corresponding effects on income inequality. The reduction in the variability of the error term also played a major equalizing role: it brought a reduction in the Gini coefficient of 2.4 points for all workers. This mostly reflects the significant equalizing effect of changes in returns to unobservables on *male* workers.[38] The variability of the error term becomes a regressive force from 1988 to 1995, as it increases significantly. During this latter period, its larger variance explains almost half -45 percent- of the total inequality increase for individual workers

Experience

During the first sub-period, less tilted and less concave earnings with respect to experience became an equalizing force for the income distribution of individual workers, contributing *minus* 0.7 points to rise in the Gini coefficient. From 1988 to 1995, changes in returns to experience are minor and their effect on inequality is trivial.

Earning differentials, or the constant term

Changes in relative earnings are equalizing in the first period but neutral in the second. Shifts in the constant term of the earnings equations reveal substantial reductions in the gender gap and relative earnings of self-employed males, and produce a moderate equalizing force from 1978 to 1988 – 0.8

[36]This outcome is consistent with the analogous decomposition exercises performed for each labor group –except for self-employed females.

[37] In summary, among males and females, we observe similar movements derived from changes in returns to education at each tail of the skill distribution. But the differences in the *scale* of those adjustments produced quite different effects on inequality indicators -unequalizing for women and neutral for men.

points for individual workers. In fact, between 1978 and 1988, average relative earnings for all groups become less differentiated and approach the average of male wage earners. The average income of self-employed males –the highest of all four groups'- falls by 9 percent, while the two lowest average earnings, those of female wage earners and self-employed females, increases by 6 and 40 percent, respectively (Table A.3).[39] From 1988 to 1995, changes in relative earnings compensate each other and have no effect on aggregate inequality. The gender gap keeps closing for self-employed females, but the relative earnings of self employed and wage-earning females become more differentiated with respect to male wage earners.

Participation and occupational choice

The participation effect is also a large unequalizing factor for individual workers in both periods; it explains 0.8 additional Gini points from 1978 to 1988, and 0.6 from 1988 to 1995. Structural changes in participation involve both changes from inactivity to activity, and within activity, change in occupational choice from wage earning to self employment (and vice versa). In order to describe the distributional impact of changes in occupational choice *both entry and exit percentiles* must be traced. In principle any individual worker will have different labor earnings as wage earning and self employed, therefore if he changes his occupational choice it will exit the wage distribution at a certain percentile and enter at a different one. From 1978 to 1988, the two most significant changes are a 4 percent shift of the labor force -mostly males- from wage earning into self employment – partially compensated by a 1 percent move in the opposite direction- and the increasing participation of women –by nearly 2 percentage points-. The female participation effect on inequality appears to be neutral; the higher than average net entries at the lower quintile and the fourth quintile tend to offset each other (Figure 4.B). However, a dominant unequalizing effect is present in the changes in occupational choice by males (Figure 4.A). Male's occupational choice changes are regressive, because the net positive entries occur at the top and lower tails, while the negative entries happen in the middle: second, third and fourth quintiles, which increases the weights at the extremes of the distribution of individual earnings. During the 1988-95 period, occupational choice behavior is quite similar, with males mostly moving from wage earning into self employment by 3.0% of the labor force, while women do the same (by 0.8%). However, contrary to the 1978-88 period, the magnitude of changes in participation are much larger and almost exclusively by females – equivalent to 4.2% of the active labor force!-. Jointly the distributional impact is unequalizing, because, for males, entries are at both extremes of the income

[38]The smaller regressive effect that this factor had on females was insufficient to dominate the equalizing impact it had on the rest of the working population.

[39] Note that relative to male wage earners' average income in 1988 (Table A.3), the self-employed male earns 1.2 times, the female wage earner 0.80 and the self-employed female receives 0.68.

distribution, and for females, most of the entries are at the lower tail of the income distribution (see Figures 4.C and 4.D).

Figure 4A. Simulated occupational choice changes by percentile of earnings. 1978-88, Males Urban Colombia (from wage earning into self employment)

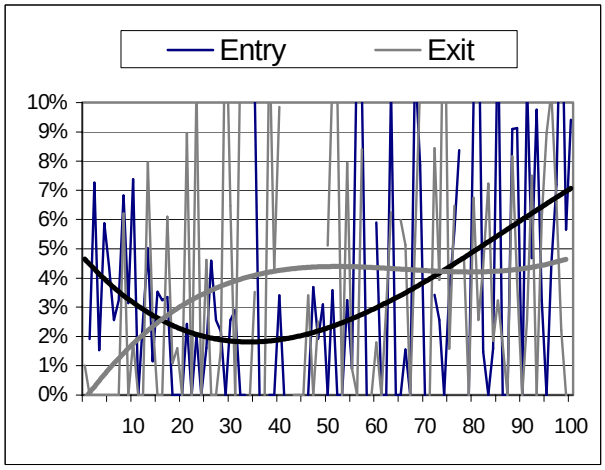


Figure 4B. Simulated participation changes by percentile of earnings. 1978-88, Females Urban Colombia (net entries)

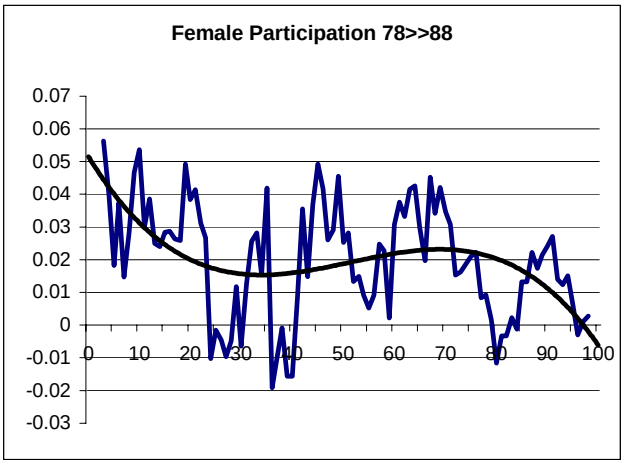


Figure 4C. Simulated occupational choice changes by percentile of earnings. 1988-95, Males Urban Colombia (from wage earning into self employment)

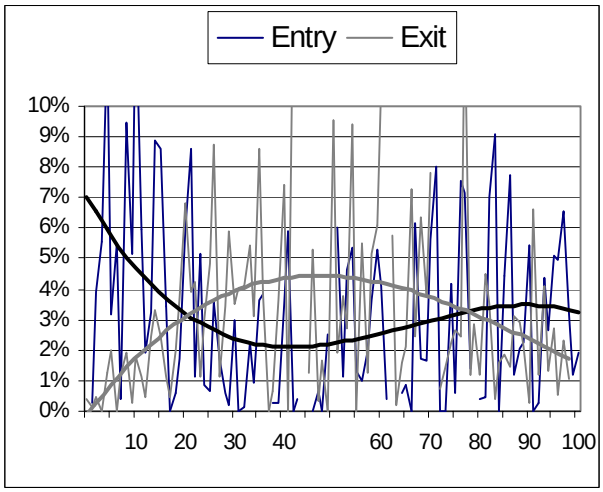
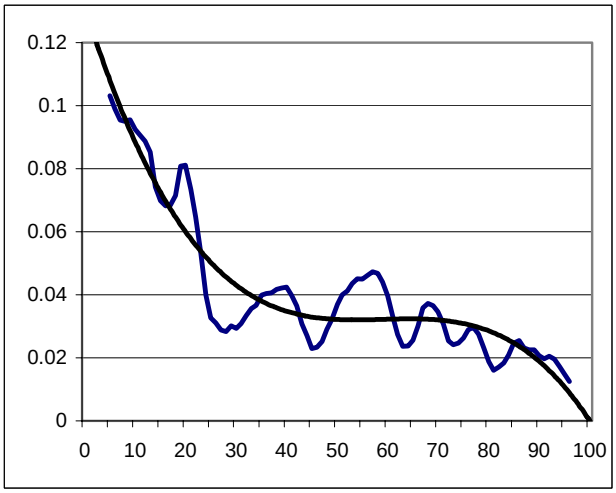


Figure 4D. Simulated participation changes by percentile of earnings. 1988-95, Females Urban Colombia (net entries)



The key structural changes that appear to explain the movements towards self employment among males and the increasing participation of females, are evident in the panels of Figure 3 above. The best candidates that account for those movement are, for males, 1) an increasing likelihood of older cohorts (with more unequal schooling within cohort) to move into self

employment and 2) the increasing probability of the less educated -in 1995- to move into self employment.[40], and for females, 3) the increasing level of participation of spouses or other females with lower levels of schooling in both periods, and 4) the increasing level of female participation – especially between 1988 and 1995- among poor households. [41]

3.1.2 Household income inequality and structural parameters: Discrepancies relative to individual income distribution

From 1978 to 1988, the dynamics of urban household income inequality and that of individual income inequality are somewhat dissimilar. Lower inequality of individual labor earnings coincides with unchanged household inequality. Income inequality at the household level shows no change - the Gini coefficient remains to be 50.2, (Tables 1 and 6), because the same equalizing forces are much weaker or non-existent, and, together with the redistributive effects of changes in non-labor income and family size, they are exactly offset by the regressive impact of changes in educational endowments and structural parameters of labor force participation. During the 1988-95 period, changes in household and individual inequality tend to be unequalzing for both aggregate and specific decomposition effects, with the exception of changes in participation and occupational choice parameters which produce regressive effects at the individual level and progressive at the household level. In this subsection we examine these discrepancies for three specific structural parameter changes: participation and occupational choice, earning differentials and experience.

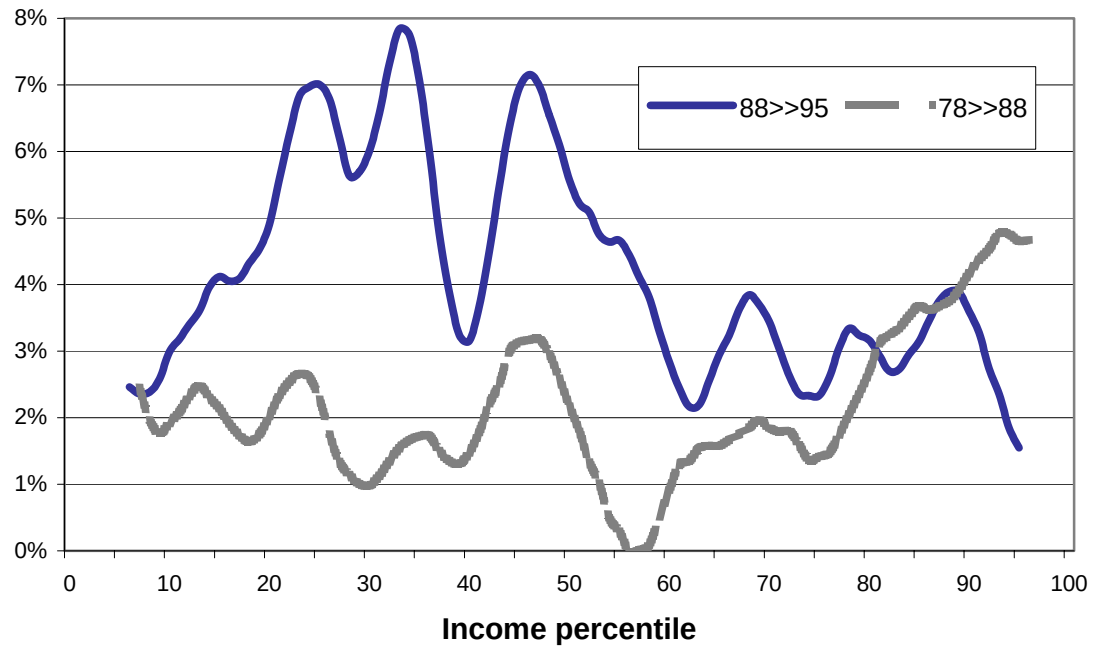
Participation and occupational choice

The active female participation explains the discrepancies between household and individual distribution dynamics from 1988 to 1995. While structural parameter changes of participation and occupational choice are unequalizing for individuals, they are equalizing at the household level - *minus* 0.4 *versus* 0.6. In fact, females represented the bulk of the changes in participation.. Figure 5 shows that the female employment rates jump up across the whole income distribution and by nearly 5 percentage points in the second and third household quintiles. Increasing labor market entries of less skilled women –with low wages- raise income of mostly poor households, and consequently reduces income per capita inequality. However, at the individual worker level this very phenomenon increases the polarization of income, and therefore wage inequality. This is contrary to what was observed in the period 1978-88, when net female entries are heavier among non-poor households at the upper tail of the income distribution (dotted line in Figure 5).[42]

Figure 5. Changes in employment rate by income percentile. Females, 1978-88 and 1988-95, Urban

[40] Additionally, less educated men belong more than proportionally to older cohorts.
[41] i.e. households with lower endowments of human capital, hence lower "full" income.
[42] Men's changes are almost neutral in both periods.

Colombia



Earning differentials, or the constant term

From 1978 to 1988, the shift in relative earnings associated with the constant term was much less equalizing at the household level - -0.2 versus – 0.8 for individuals-. Strong gender gap reductions benefit female wage earners that are near the middle of the individual earnings distribution but more than proportionally *belong to middle-high income households.* Concentration Coefficients by occupational group show that wage-earning females rank much higher in the distribution of household income than in the distribution of individual income.[43] This implies that their gains in relative income are unequalizing and attenuate the other equalizing effects.

Experience

During the 1978-88 interval, the equalizing effect of changes in returns to experience at the individual level are not visible at the household level. While the Gini coefficient for individuals fell by 0.7 points, it increased by 0.1 points for households. The explanation of this discrepancy is similar to that of the case of relative earnings. Simulations show that more experienced female wage

[43] Concentration Coefficients –*CC*- are the covariance between the labor activity dummy and the percentiles of the distribution of household income divided by the mean of activity level. The highest and most regressive *CC* corresponds

earners had huge earning gains for the reduction in concavity of the earnings function. They are in the middle of the individual earnings distribution , but belong more than proportionally to middle- and high-income households. Therefore their earning gains do not contribute a reduction in inequality at the household level.

Finally, we note that unexplained residual changes in household inequality are comparable over time and similar in magnitude to those of individual earnings distribution.

3.1.3 Endowment effects and non-labor income

Paradoxically, education endowment equalization deteriorates income inequality in urban areas, but not in rural areas

The change in education endowments has opposite effects on urban and rural income inequalities. In urban areas, changes in educational endowments have an *unexpectedly* regressive impact on both household and individual income inequality, explaining increases of up to 2.3 Gini points and 3.0 points respectively from 1978 to 1988 and 1.2 and 0.8 respectively from 1988 to 1995 (Table 6). However, in rural areas, the education endowment effect *reduces* household and individual income inequality: 0.5 and 2.8 points respectively during the first sub-period and 0.3 and 1.4 respectively during the second. This effect is surprising because, as we saw in Section 1, over the whole period, the distribution of urban educational endowments among urban and rural workers becomes less unequal and the new cohorts of individuals entering the work force are more educated and are less differentiated in terms of years of schooling.

One would expect that more equality in education would lead to reductions in income inequality. However, during the last two decades, simultaneously with the higher educational attainment of new cohorts, the earnings curve by education has become remarkably convex. Therefore, individuals with identical absolute increments in education are more distant in terms of income and consequently income inequality increases.

To follow the intuition behind the latter claim, consider a simplified framework of two individuals ($i = 1,2$) that have different rates of return to education, r_i -higher for the most educated individual, $r_1 < r_2$- and that inequality is given by the ratio of incomes Y_2/Y_1. If both individuals experience an increase in schooling, ΔS_i, the proportional rise in labor income α is equal to [44]

$$\alpha_i = r_i \Delta S_i, \qquad i = 1, 2.$$

To maintain constant income inequality, changes in schooling *should be*, ΔS^*_i, such that both individuals have the *same percentage change in income*, $\alpha = \alpha_1 = \alpha_2$, that is

---

to wage earner females –*wef*- and the lowest to self-employed females –*sef-: CCsef=1% < CCsem = 9% < CCall=13% < << CCwef = 24%.*

$$r_1 \Delta S^*_1 = \alpha = r_2 \Delta S^*_2$$

Therefore, since individual 1 has a lower rate of return to education than individual 2, the increase in education for the latter must be smaller than for the former. That is, the ratio in changes in schooling should be inversely related to the ratio of rates of return:

$$\Delta S^*_1 = \Delta S^*_2 (r_2/ r_1) > \Delta S^*_2 , \qquad \text{where } (r_2/ r_1) > 1$$

Thus, *if rates of return are increasing with levels of schooling, the observed changes in schooling will increase income inequality unless those changes in the distribution of educational endowments are sufficiently egalitarian*. Consider an egalitarian change in educational endowments: $\Delta S_2 < \Delta S_1$, more for the less educated. If the rise in schooling of the less educated individual is not as large as required, ΔS^*_1,

$$\Delta S_2 (r_2/ r_1) = \Delta S^*_1 > \Delta S_1 > \Delta S_2,$$

income inequality will consequently increase.[45] The Colombian labor market illustrates this problem, the rate of return to education for a college graduate is nearly *twice* the rate for an individual with average education *and* the ratio between the two has increased by 10 percent from 1978 to 1995. As a result, egalitarian changes in educational endowments required to prevent an increase in income inequality are becoming more difficult to attain.

Differences in the profile of returns to education between urban and rural areas explain the discrepancy of the impact of education endowment equalization on income inequality. Education attainment is higher and more equally distributed in urban areas, but the improvements in inequality indicators are almost identical in both areas.[46] So how could similar education endowment equalization produce *opposite* effects on income distribution in urban and rural areas? In urban areas, returns to education are higher and the earnings functions are more convex as well.[47] Consequently, inter-quartile (1st to 3rd) differences in returns by levels of education and skill wage premiums are much higher in urban areas. Hence, according to the analysis above, in order to maintain the inter-quartile inequality of earnings, the required change in educational endowments must be always equalizing in both cases, but should be more progressive in urban areas, which have larger differences in returns to schooling. In other words, it is possible to find educational policies that produce opposite changes on urban and rural income inequality. In fact, according to our

[44]Without loss of generality, suppose that labor income is represented by a "mincerian" equation and depends exclusively on the level of schooling *S* and the returns to schooling *r*. Hence individual income is equal to $ln\ y_i = r_t S_i$.

[45]For a detailed explanation and a general proof see Vélez (2000). We acknowledge the valuable suggestion of François Bourguignon to develop and simplify the presentation of this section.

[46] Average schooling is nearly twice and the coefficient of variation is approximately two thirds of the corresponding value in rural areas. The reduction in the coefficients of variation was 15 percent between 1978-88 and 6 percent between 1988 and 1995.

[47]Several studies have shown evidence of rural-urban labor market segmentation in Colombia. See, Urrutia, 1993; Jaramillo y Nupia, 1998 and Jaramillo, Romero y Nupia, 2000.

calculations, an egalitarian educational policy that provides the third quartile in the distribution of education *half* the additional years of education corresponding to the first quartile will *reduce inequality of earnings* in *rural* areas by 1.2 percent. On the other hand, that *same policy* will *increase inequality of earnings* by 2.6 percent in urban areas.

Family size is always equalizing

Average family size in urban areas fell from 5.1 to 4.3 from 1978 to 1988 and produced an equalizing effect of 0.6 Ginin points. Nearly half of that change is explained by the reduction in the average number of children less than 13 years old per household from 1.77 to 1.33. The number of children in urban households is modeled as a function of the education and age of the household head and his or her spouse, plus some regional dummies.[48] Our estimation explains approximately 75 percent of the total change and the remainder is probably caused by changes in the age and education of household heads and their spouses. Average family size did fall at a much slower pace from 1988 to 1995. The average number of children per household only fell by one tenth; however, the total effect remained strong and equalizing, at 0.4 Gini points.

Non-labor income effect: always unequalizing and moderate

During the first sub-period, changes in the distribution of non-labor income played a moderate unequalizing role in income inequality among urban Colombian households. Non-labor income not only increased its share of total income by almost 5 percentage points, but also increased per capita income inequality by 0.8 Gini points. From 1988 to 1995, it kept its relative share in the income distribution unchanged and its distribution became more unequal and produced a 0.6 point rise in the Gini coefficient.

In summary, the model succeeds in explaining and decomposing the reversal of inequality trends in urban Colombia. Discrepancies between individual and household income distribution dynamics are mainly associated with female participation and occupational choice and the decreasing gender gap. Education endowment changes are a major component of residual effect. Endowment effects explain most of the residual left from changes in structural parameters. Other determinant factors to highlight are: the large effect of returns to education (78-88), residual variance plus minor but persistent effects of participation and the fertility effect. Finally, fluctuating forces dominate persistent factors in the short run.

3.2 Rural Areas: The Reversal of Inequality Losses from 1988 to 1995.

During the two decades covered by this decomposition exercise, the distribution of income in rural areas underwent an inverted *U* in terms of inequality. The deterioration of income inequality during the 1978-88 sub-period was reversed in the second sub-period, 1988-1995 -the Gini coefficient fell

[48]With quadratic and cubic terms on education and age. See parameter estimates in Table A.4 in the appendix.

by 2.4 percentage points for individuals and 3.7 for households. Over the whole period, income inequality fell because the improvements of the later sub-period more than compensated the inequality increase of the initial sub-period. Consequently, from 1978 to 1995, the net gains in the inequality index for household and individual earnings were equal to 1.9 and 2.7 respectively. We limit our decomposition exercise in the rural areas to the second sub-period 1988-95. Unfortunately, the decomposition of the 1978-95 period reveals some fundamental inconsistencies in the data for that period.

1988-1995:
The Persistent Equalizing Effect of All Observable Factors Generates Lower Income Inequality

From this decomposition exercise, we conclude that *all observable* factors –prices and endowments- produce equalizing effects on the income distribution of individual rural workers and households. The variables that explain the changes in the distribution of individual earnings, ordered by the magnitude of their effect, were the reduction of the variance of the error term, the change in returns to human assets -education, age and regional location-, the improvements in educational endowments and, finally, changes in the structural parameters of occupational choice.

At the household level, all determinant factors produce similar effects, although the order of importance is somewhat different: first, the reduction in family size –0.7 percentage points-, second, the structural changes in occupational choice, third, the improvement in schooling endowments of the labor force, fourth the smaller variance of the error term in the earnings equation and, finally, the changes in returns to human assets.

Compared to urban areas, rural income dynamics shows both similarities and discrepancies. Similar results are observed in the case of equalizing changes in returns to education and experience and in the reduction in family size. The three cases of discrepancies are regional dummies –negligible in the urban case-, participation and occupational choice –progressive instead of regressive for individual workers- and education endowment equalization with equalizing effects -as explained in section 3.1. The net inflow of workers into the labor force had a progressive profile and was larger for females (Figure 5). These events generated major improvements in earnings for the poorest 30 percent of the population (Figure 6) and produced a fall in the Gini coefficient for individual workers and households of 0.9 and 0.4 percentage points respectively.[49] Therefore, the two main contrasts between income distribution dynamics at the urban and rural levels are 1) participation effects are *always* progressive and there are no discrepancies between individual and household effects and, 2) education endowment equalization produces equalizing effects thanks to more a homogeneous profile of returns to education by skill level.

4. Conclusions and Discussion

By measuring the contributions of determinant factors at both the household and individual levels, the model succeeds in explaining and decomposing the reversal of inequality trends in urban and rural Colombia. Notable determinant factors include the strong equalizing effects coming from the structure of earnings by education (1978-88), experience, the gender gap, and residual variance. In the residual effect, we find that education endowment plays a dominant role. Increase in female labor force participation and the general shift in occupational choice away from wage earning jobs and towards self-employment produce minor but persistent unequalizing effects on individual earnings. Producing a -persistent equalizing effect are reductions in fertility rates, as proxied by household size. Discrepancies between individual and household income distribution dynamics are mainly associated with the increase female labor force participation and changes in occupational choice, as well as the decreasing gender gap, particularly since wage-earning females rank much higher in the distribution of household income that in the distribution of individual income.

We found that the fall in inequality among individual workers from 1978 to 1988 was caused by the dominant aggregate effect of *four strong equalizing forces*: (i) changes in returns to education, especially among wage earners; (ii) lower variability of the error term in the male earnings equation; (iii) changes in returns to experience and (iv) changes in relative earnings between occupational groups. The three weaker unequalizing factors are (i) the increase in the educational endowments; (ii) the rise in labor force participation produced by the change in the parameters of the occupational choice model and (iii) the deterioration in the distribution of non-labor income. The reduction of household size also produced equalizing effects at the household level. Nevertheless, household income inequality remains constant during the period because the aggregate effect of equalizing forces becomes much weaker and is neutralized by the regressive impact of changes in educational endowments and structural parameters of labor force participation.[50]

A sharp increase in urban income inequality occurred between 1988 and 1995. Most of the forces that produced inequality changes in the previous period reversed their role or became neutral after 1988. In fact, although some factors persisted in their previous role, some others showed strong fluctuations in their impact on inequality. The big rise in income inequality from 1988 to 1995 has *five major regressive* forces behind it that dominate the weaker effect of reduction in family size

[49] 32 percent for the poorest 10 percent and close to 12 percent for the second and third deciles.

[50] Despite these identifiable common characteristics, specific factors yield different effects across gender groups -equalizing and unequalizing-, and consequently inequality changes were heterogeneous between occupational groups. In

and changes in participation at the household level. They are: (i) the larger variability in the error term; (ii) the increasing inequality of non-labor income; (iii) the expansion and equalization of working population education endowments; (iv) the change in relative earnings between the four occupational groups –at the household level-; and (v) the changes in occupational choice -at the individual level-. The impact of changes in returns to human capital characteristics such as education became much weaker or completely neutral; however, they have heterogeneous effects across occupational groups. They serve as equalizers among the self-employed –predominantly for females- and are unequalizing for wage earners –almost exclusively for females-. During this period, inequality increased for all occupational groups, except for self-employed females, who enjoyed an improvement in income inequality, thanks to the significant equalizing effect of changes in returns to education.

Income distribution dynamics result from a combination of persistent and fluctuating factors. We identify four *persistent* and five *fluctuating* factors (Table 6). The more persistent effects come mostly from the demographic and the labor supply side, namely the increase in education endowments, the reduction in family size and the increase in labor force participation, plus non-labor income. The aggregate effect of the former two added to non-labor income dominated the progressive effect of the latter and consequently, the net impact of *persistent* factors was always regressive. The fluctuating factor set includes returns to human assets -with the exception of experience-, and the variability of the error term and presents shifting effects over time: progressive between 1978 to 1988 and regressive from 1988 to 1995. Throughout both periods, the magnitude of their aggregated impact was stronger when compared to the effect of the persistent factors, making it a clear determinant of the observed change of income inequality. The "erratic" behavior of these major determinants of the dynamics of income inequality unveils the significant difficulties of any attempt to predict its evolution in urban areas. That is, in addition to the net regressive effect of persistent factors, the aggregate effect of fluctuating factors is much larger and unstable. However, since the fluctuation tend to cancel out in the long run, the joint effect of persistent factors becomes the best available predictor of long run inequality trends.[51]

Surprisingly education endowment equalization has asymmetric effects on rural and urban inequality. Intuitively, a more educated labor supply should lead to a reduction in returns to human assets and, consequently, to improvements in income inequality. At the same time, larger and more

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fact, from 1978 to 1988, there was a reduction in inequality among male workers, but a significant increase for female –wage earning and self-employed-workers.

[51]Notice that these findings are relatively free of business cycle effects since the three cut-off years correspond to levels of minimum unemployment. However, the increasing demand for more educated workers, induced by skill biased technological change, might be a permanent shift. In that case, the joint effect of persistent forces would be even more unequalizing.

egalitarian education endowments should reinforce the equalizing effect on income. Our decomposition of endowment effects coincides with these claims only in the Colombian rural area: the price (returns) and endowment effects are both egalitarian and reinforce each other. But paradoxically, in the urban area, the endowment effect is always regressive and the price effect is only progressive and smaller during the 1978-88 period. We showed that differences in the profile of returns to education between urban and rural areas explain that discrepancy. Nevertheless, the potential gains of income equality lost due to the increasing convexity of the earnings equation in urban areas might be recovered in the future. If changes in the supply and demand for skills produce an equalization of rates of return to education –a less convex earnings function-, the gains in income equality would be substantial and should include the benefits of the equalization of educational endowments during the last two decades.

It is also surprising that, participation changes –mainly women's- generated asymmetric effects on income per capita distribution *vis a vis* individual labor earnings distribution. In fact, the discrepancy between the simulated *regressive* impact of structural changes in participation at the individual level and the simulated *progressive* effect at the household level from 1988 to 1995 is mainly associated with female behavior. While, mostly unskilled females entering in large numbers into the labor market raise per capita income of predominantly poor households -consequently reduces income inequality-, at the worker level that same phenomenon increase the polarization of individual labor income at the tails of the distribution –raising wage inequality.

It is important to remark that –in general- households appear to exacerbate static inequality among workers, but at the same time attenuate the income shocks falling upon individuals. Observed inequality in urban and rural areas is systematically lower for individual earnings than for household per capita income (Tables A.1.E-F and A.2.A-B). Somehow household structure in terms of assortative matching of individual human capital endowments, choice of family size and labor force participation, and non-labor incomes explain the extra income inequality at the household level. On the other hand, in almost every case, dynamic decomposition by determinant factors reveals stronger effects for the distribution of individual labor earnings than at the household level. This implies that households would operate as a self protection mechanism by partially neutralizing the higher distributional instability of individual earnings relative to determinant factors.[52] .

The literature offers alternative explanations for the recent rise in skill premia in Colombia: technological change, trade openness, or simply, excessive demand relative to supply of high-skilled workers. Empirically, it is difficult to separate trade from technology. In the early 1990s,

[52] Self protection as defined in the framework of Enrlinch and Becker (1972). The same framework adopted by the recent World Bank report on economic insecurity Latin America (Di Ferranti, *et al* , 2000).

trade liberalization and increases in the relative price of labor with respect to capital created a favorable atmosphere for capital intensive investment and increased demand for skilled workers, pushing up wage differentials.[53] According to Cárdenas and Gutiérrez (1996), increasing skill premia are linked to technological progress since in the Colombian manufacturing industry, capital and skilled labor are complementary inputs while high-skilled and low-skilled labor are substitutes. Wood (1997) links the international trend of increasing skill earning differentials to trade openness with countries that have lower skilled labor endowments. Núñez and Sánchez (1998) suggest that both supply and demand play a concurrent role in the Colombian case, and find evidence supporting both the trade and technology hypotheses.[54] They conclude that relative demand for college-educated workers increased significantly in the late 1980s and especially in the early 1990s, and it was mostly due to technological change rather than to growth. But they also find that, after 1991, economic sectors exposed to international trade competition explain an increasing share of the demand for workers with complete or incomplete college education. On the contrary, Santamaria (2000), finds no evidence linking higher skill premia and trade openness. This longitudinal study of Colombian household surveys since 1978 finds that the trend of higher skill-biased wage premia started in the mid 1980s, well before the structural reforms of the 1990s, thus supporting only the technology hypothesis.[55]

The rise in skill premia can be partially attributed to the sluggish supply of high-skilled workers, as noted above.[56] If shortages persist, wage differentials will further increase, with perverse effects on labor income inequality, *both via returns and educational endowment effects*. We are concerned that concentrating government subsidies completely away from post-secondary education -in the interest of targeting improvement- *will jeopardize* the supply of highly educated workers. Currently, investments in higher education have such high real returns that credit, combined with targeted subsidies, would be appropriate in stimulating the supply of tertiary education.

The persistent and stable factors that determine income inequality have strong economic links to underlying fundamentals. What have been the driving forces behind the changes in average education level, fertility rates and female participation rates in the labor market that have significantly impacted income inequality? One such force is the dynamic provision of education at secondary and tertiary levels. Not only has there been a public effort to provide subsidized education for people with liquidity constraints, but the market has responded dynamically to

[53] However, this inequality impact was almost completely neutralized by the additional demand for unskilled labor created by a simultaneous real estate construction boom.

[54] See also Cárdenas and Gutiérrez (1996)

[55] The literature has identified this as a worldwide phenomenon: Juhn, Murphy and Pierce (1993) and Mincer (1996) showed that the growing skill bias in the demand for labor started in the U.S. in the 1970s and Murphy, Ridell and Romer (1998) are able to explain its evolution using a cross country model.

effective demand through the private provision of education. Secondly, demand side changes are also behind these phenomena. During the last two decades, the dramatic increase in educational attainment, higher labor force participation, and lower fertility rates among women has been largely determined by the increasing opportunity cost of women's time –the value of labor market opportunities associated with larger GNP per capita- that has shifted the equilibrium of the Colombian family towards fewer and more educated children[57]. Thus, the link between economic growth and the economic dynamics of the family have not only reinforced the demand for education -with unexpected unequalizing effects-, but have produced equalizing changes through reductions in family size and greater women's labor force participation. However, large differences in family size remain across female education levels. Increasing the access of the poorest urban families to inexpensive family planning methods could produce additional equalizing effects.

In summary, this paper's focus is consistent with preceding research of static inequality decomposition in Colombia. It concentrates on a similar set of key determinant variables of the level and evolution of inequality as those identified by the previous studies:[58] education, family size, work experience and labor force participation. However, the results of this paper expand the understanding of these phenomenon by explicitly isolating both price and quantity effects and providing a measure of how much, in which direction and how persistently each of these variables explains the dynamics of income inequality in Colombia. Moreover, showing that even moderate inequality changes conceal strong counterbalancing effects of equalizing and unequalizing forces.

[56] According to Santamría's (2000) estimates, the elasticity of high skill premium to supply approximately *minus 0.5.*

[57] As suggested by Robbins (1988), using a model of demand for children (quantity-quality).

[58] Using household survey data, Musgrove (1986) and Medina and Moreno (1995) find that heads' education is the main explanatory factor of inequality, followed by family size, heads' age, economic sector and heads' gender. Bernal *et al's* (1997) entropy measure decomposition reiterates the key role of education. Even time series studies, Bernal *et al* (1997), have identified the regressive effects of unemployment and slow growth on income inequality. Finally with Sánchez and Núñez (2000), a very important study on cross municipals differences on economic development which finds that human capital endowments explains 44 percent of inequality across municipalities –especially via college graduates, 28 percent!-, while infrastructure difference account for 22 percent of the total.

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Technical Appendix

A. Urban Data

Surveys

The household surveys used for this paper are EH19 from June 1978, EH 61 from September 1988 and EH 89 from September 1995, all from DANE, Colombia. To maintain comparability over the years of the study, we represent the urban area by the largest seven cities or what is called -"Urbano Tradicional"-. Thus we exclude medium and small sized urban areas -"Resto Urbano"- from the surveys of 1978 and 1995. The remaining group of cities is what we call "Urban Colombia". They account for 67 percent of the urban population (average over 1978-98) and are very heterogeneous in terms of location and socio-economic characteristics (they are Barranquilla, Bucaramanga, Bogotá, Manizales, Medellín, Cali and Pasto)[59].

Top Coding and Non-Informants

We were concerned with the integrity of the data, which led us to decide to introduce as little "noise" as possible. That is, we did not impute earnings to non-informants, nor did we correct for the top-coding problem present in the ENHs. Regarding non-informants, our decision was to delete them. That is, we discarded all households who reported total income of zero or did not report at all (missing). Additionally, all households in which at least one of its members was employed at the time of the survey but did not report income were deleted. These adjustments implied the deletion of nearly 20 percent of the original number of households present in the sample. To account for this reduction in the number of observations, we re-scaled the sampling weights up, by dividing the sample into 42 city-strata cells (42 = 7 cities times 6 strata), and multiplying the original sampling weights by the ratio of the pre to post deletion number of weighted observations.

Price Deflators

All income sources in the three household surveys were deflated with Colombian CPI provided by DANE, Departamento Nacional de Estadística. For each city we applied its own CPI, to take into account differences in regional prices. The base month and year is December 1988.

B. Rural Data

Rural household surveys for the years 1978, 1988 and 1995 were used. These surveys are carried out by the DANE.[60] The size of the surveyed samples were, respectively, 13,084, 18,781 and 19.992 (3,504, 5,603 and 6,020 households). These samples were taken in the four most populated regions in the country (Atlantic, Oriental, Central and Pacific). The relevant information was taken only from households whose income was obtained by labor activities, considering thus all the other income sources as exogenous.

The following adjustments and corrections of the surveys were done: 1. The rurality criteria considered in the polls since 1988 were applied when analyzing the 1978 poll, thus being able to make comparisons. 2. In the three polls, households were removed from the analysis mainly for three reasons – the head of the household did not tell what was the labor income, in spite of being occupied, -The proportion of the "not informants" was more than 50% of the occupied population.3. People in charge of the domestic service who live in the households, their children

[59]In the 1978 survey the coding of the metropolitan areas changed and thus we resorted to other methods –mainly demographic- to identify the seven cities. Although we are confident of the outcome of this exercise, it is not 100% exact.

[60]National Department of Statistics (Departamento Nacional de Estadísitca)

and pensioners were removed from the analysis.4. Households with no income were removed.5. Outliers were removed. 6. The factor of expansion was calculated again taking into account the "Territorios Nacionales," as well as the households that were eliminated due criteria formerly outlined.

Table A.1.A Decomposition of Within-Group Income Distribution Changes (1978-1988, 1988-1995)
Wage Urban Males, Colombia

	Contribution to change in inequality							
	1978 to 1988				1988 to 1995			
	GINI	E(0)	E(1)	E(2)	GINI	E(0)	E(1)	E(2)
Observed Inequality 1978	42.1	29.8	34.2	55.2				
Observed Inequality 1988	39.5	26.1	32.0	55.1	39.5	26.1	32.0	55.1
Observed Inequality 1995					45.0	34.2	48.9	151.4
Total change in inequality	-2.6	-3.7	-2.1	-0.1	5.5	8.1	16.9	96.2
Average Contribution	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**
II Returns(**)	-4.5 173	-6.1 165	-7.3 340	-14.5 15737	-0.1 -1	-0.1 -1	0.4 2	2.7 3
Education	-4.2 162	-5.7 156	-7.3 340	-15.4 16796	0.2 4	0.3 4	0.8 4	3.3 3
Experience	-0.7 29	-1.1 29	-1.0 44	-1.7 1840	-0.3 -6	-0.5 -6	-0.5 -3	-1.2 -1
Regions (**)	0.2 -8	0.3 -9	0.5 -24	1.4 -1508	0.1 1	0.1 1	0.1 1	0.6 1
Interaction term	0.0 0	-0.1 3	-0.2 9	-0.6 619	0.0 0	0.0 0	0.0 0	0.0 0
III Endowments (*) (**)	4.3 -165	5.4 -147	8.6 -401	20.9 -22795	2.1 38	3.1 38	8.4 50	58.5 61
Education	0.8 -32	1.2 -33	1.4 -64	2.8 -3011	-0.1 -2	-0.1 -2	-0.2 -1	-0.8 -1
Rest	3.5 -133	4.2 -114	7.2 -337	18.2 -19784	2.2 40	3.2 40	8.6 51	59.3 62
IV Errors	-2.5 95	-3.5 96	-4.5 208	-10.9 11907	3.5 64	5.2 63	8.1 48	35.8 37
V Interaction term	1.1 -41	1.0 -28	0.7 -33	0.0 -54	-2.3 -42	-2.4 -30	-6.8 -40	-98.5 -102

** includes only simulations with parameter estimates of the 1988 model, for the period 1988-1995
* Imputed as a residual.
Source: Table %, in the Appendix

Table A.1.B Decomposition of Within-Group Income Distribution Changes (1978-1988, 1988-1995)
Self Employed Urban Males, Colombia

	Contribution to change in inequality							
	1978 to 1988				1988 to 1995			
	GINI	**E(0)**	**E(1)**	**E(2)**	**GINI**	**E(0)**	**E(1)**	**E(2)**
Observed Inequality 1978	60.8	68.3	83.0	255.1				
Observed Inequality 1988	53.5	51.8	56.6	108.9	53.5	51.8	56.6	108.9
Observed Inequality 1995					59.4	64.2	87.2	288.2
Total change in inequality	-7.3	-16.5	-26.5	-146.2	5.9	12.4	30.7	179.3
Average Contribution	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**
II Returns(**)	-1.4 19	-3.7 22	-2.9 11	-0.3 0	-0.4 -7	-1.1 -9	-1.1 -4	-7.1 -4
Education	-0.1 2	-0.5 3	0.1 -1	4.3 -3	-0.7 -11	-1.7 -14	-1.5 -5	-5.3 -3
Experience	-0.8 10	-2.3 14	-1.8 7	-8.8 6	0.1 2	0.2 2	-0.1 0	-2.1 -1
Regions (**)	-0.5 7	-0.6 4	-1.0 4	11.4 -8	0.2 4	0.5 4	0.5 1	0.1 0
Interaction term	0.1 -1	0.1 0	0.0 0	-3.1 2	0.0 -1	0.0 0	0.0 0	0.3 0
III Endowments (*) (**)	-1.7 23	-2.5 15	-10.4 39	-78.5 54	5.7 95	11.8 96	29.5 96	174.5 97
Education	1.3 -17	3.2 -19	3.8 -15	18.1 -12	0.1 2	0.2 2	0.1 0	-0.6 0
Rest	-3.0 40	-5.7 35	-14.2 54	-96.6 66	5.6 94	11.6 94	29.4 96	175.1 98
IV Errors	-3.9 53	-9.7 59	-11.7 44	-51.1 35	0.7 11	1.6 13	2.3 7	11.4 6
V Interaction term	4.2 -57	9.9 -60	18.5 -70	263.3 -180	-3.4 -56	-7.2 -58	-22.1 -72	-357.2 -199

** includes only simulations with parameter estimates of the 1988 model, for the period 1988-1995
* Imputed
Source: Table %, in the Appendix

Table A.1.C Decomposition of Within-Group Income Distribution Changes (1978-1988, 1988-1995) (Heckman2S)
Wage Urban Females, Colombia

	Contribution to change in inequality							
	1978 to 1988				1988 to 1995			
	GINI	E(0)	E(1)	E(2)	GINI	E(0)	E(1)	E(2)
Observed Inequality 1978	32.7	18.7	19.7	27.2				
Observed Inequality 1988	34.3	20.4	23.1	35.4	34.3	20.4	23.1	35.4
Observed Inequality 1995					39.1	25.7	32.0	70.2
Total change in inequality	1.5	1.7	3.4	8.1	4.8	5.3	8.9	34.9
Average Contribution	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**
II Returns(**)	-1.9 -123	-2.0 -115	-2.3 -67	-3.8 -47	3.0 62	3.5 67	4.6 52	10.0 29
Education	-2.6 -167	-2.8 -163	-3.5 -102	-6.3 -78	3.0 62	3.5 66	4.7 53	11.0 31
Experience	-0.1 -9	-0.1 -8	-0.1 -3	0.0 0	0.1 1	0.1 1	-0.1 -1	-1.0 -3
Regions (**)	0.2 12	0.1 7	0.3 8	0.1 2	0.0 -1	0.0 -1	0.0 -1	-0.2 -1
Interaction term	0.0 1	0.0 -2	-0.1 -2	-0.2 -3	0.0 0	0.0 0	0.0 0	0.2 1
III Endowments (*) (**)	3.3 214	3.6 205	5.5 161	11.6 142	0.3 6	-0.3 -5	1.5 17	15.6 45
Education	0.5 32	0.5 31	0.6 18	1.1 13	0.0 -1	0.0 -1	0.0 -1	-0.1 0
Rest	2.8 181	3.0 174	4.9 143	10.5 130	0.3 6	-0.2 -5	1.5 17	15.8 45
IV Errors	0.2 10	0.2 11	0.2 7	0.5 6	1.5 32	2.0 39	2.8 32	9.5 27
V Interaction term	-0.5 -34	-0.3 -20	-0.7 -21	-2.6 -31	-1.8 -37	-1.2 -23	-2.4 -27	-18.1 -52

* Imputed

** includes only simulations with parameter estimates of the 1988 model, for the period 1988-1995

Source: Table %, in the Appendix

Table A.1.D Decomposition of Within-Group Income Distribution Changes (1978-1988, 1988-1995) (Heckman2S)
Self Urban Females, Colombia

	Contribution to change in inequality							
	1978 to 1988				1988 to 1995			
	GINI	E(0)	E(1)	E(2)	GINI	E(0)	E(1)	E(2)
Observed Inequality 1978	54.0	52.9	57.6	109.1				
Observed Inequality 1988	59.0	66.6	72.9	171.6	59.0	66.6	72.9	171.6
Observed Inequality 1995					57.4	62.6	78.1	308.3
Total change in inequality	5.0	13.7	15.2	62.5	-1.6	-4.0	5.2	136.7
Contribution (%)	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**
II Returns**	1.0 20	2.1 15	2.4 16	7.9 13	-2.7 164	-6.6 167	-6.9 -131	-29.7 -22
Education	0.1 3	0.3 2	0.3 2	0.2 0	-2.6 160	-6.3 159	-6.3 -120	-14.5 -11
Experience	-0.2 -4	-0.4 -3	-0.9 -6	-3.8 -6	0.2 -15	0.6 -15	0.2 4	-4.9 -4
Regions **	1.0 20	2.1 15	3.2 21	14.8 24	-0.4 24	-1.0 26	-1.0 -20	-5.4 -4
Interaction term	0.1 2	0.2 1	0.3 2	1.1 2	0.0 0	-0.1 2	-0.2 -4	-3.8 -3
III Endowments * **	3.0 60	9.1 66	10.3 68	47.2 76	0.8 -50	2.0 -51	11.1 212	157.3 115
Education	0.4 8	0.9 7	0.9 6	2.0 3	0.0 -1	0.1 -2	0.0 0	-0.3 0
Rest	2.6 52	8.2 60	9.4 61	45.2 72	0.8 -49	1.9 -49	11.1 212	157.6 115
IV Errors	1.0 20	2.6 19	2.8 18	9.8 16	0.2 -13	0.6 -14	0.8 15	5.7 4
V Interaction term	-2.8 -57	-8.2 -60	-9.9 -65	-88.2 -141	1.0 -58	2.6 -65	-4.0 -75	-328.2 -240

** includes only simulations with parameter estimates of the 1988 model, for the period 1988-1995
* Imputed
Source: Table %, in the Appendix

Table A.1.E

Decomposition of Changes in Individual Income Inequality, 1978-1988 and 1988-1995. Urban Colombia.

	Contribution to change in inequality															
	1978 to 1988								1988 to 1995							
	GINI		E(0)		E(1)		E(2)		GINI		E(0)		E(1)		E(2)	
Inequality 1978	47.8		40.6		49.6		136									
Inequality 1988	44.7		35.7		41.3		79.8		44.7		35.7		41.3		79.8	
Inequality 1995									50.3		44.8		62.9		221.4	
Inequality change	-3.1		-4.8		-8.3		-55.8		5.5		9.0		21.5		141.6	
Contribution (%)		(%)		(%)		(%)		(%)		(%)		(%)		(%)		(%)
I. Participation	0.8	-26	1.5	-31	1.6	-20	3.7	-7	0.6	10	1.2	13	1.4	6	6.7	5
Males	0.6	-21	1.1	-23	1.3	-16	2.6	-5	0.4	7	0.7	8	1.0	5	4.4	3
Females	0.1	-5	0.4	-8	0.3	-4	1.1	-2	0.2	3	0.5	5	0.4	2	2.3	2
II. Returns	-3.6	119	-6.0	123	-7.1	86	-20.6	37	0.2	3	-1.1	-12	1.7	8	10.6	7
Education	-2.3	75	-3.5	71	-3.8	46	-4.2	8	0.0	0	-0.2	-2	-0.3	-1	-3.9	-3
Experience	-0.7	22	-1.1	24	-1.2	15	-5.4	10	-0.1	-1	-0.1	-1	-0.2	-1	-1.6	-1
Regions	0.0	1	0.2	-4	-0.2	2	2.7	-5	0.0	1	0.0	0	0.3	1	1.3	1
Constant	-0.8	28	-1.8	37	-2.3	28	-14.1	25	0.0	0	-1.0	-11	1.5	7	15.3	11
Interaction	0.2	-7	0.3	-5	0.5	-6	1.1	-2	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	0
III. Endowments	2.3	-74	3.9	-82	3.4	-41	-11.9	21	2.5	46	5.0	55	13.7	63	105.7	75
Education	3.0	-100	4.8	-99	6.1	-74	18.4	-33	1.2	22	1.8	20	2.4	11	6.6	5
Earnings effect	3.3	-108	5.3	-109	6.7	-81	20.2	-36	1.4	25	2.2	24	2.8	13	7.2	5
Participation induce	-0.3	9	-0.5	10	-0.6	8	-1.9	3	-0.2	-4	-0.4	-4	-0.4	-2	-0.5	0
IV. Error term	-2.4	80	-4.1	85	-6.3	77	-29	53	2.5	45	4.3	47	7.3	34	26	19
V. Interaction	0.1	-3	0.1	-3	0.2	-2	1.0	-2	0.3	6	0.6	7	0.4	2	-0.2	0

Table A.1.F
Decomposition of Changes in Household Income Inequality, 1978-1988 and 1988-1995. Urban Colombia.

	Contribution to change in inequality															
	1978 to 1988								1988 to 1995							
	GINI		E(0)		E(1)		E(2)		GINI		E(0)		E(1)		E(2)	
Inequality 1978	50.2		38.0		52.6		153.6									
Inequality 1988	50.2		42.5		50.3		105.1		50.2		42.5		50.3		105.1	
Inequality 1995									54.4		50.5		70.6		282.7	
Inequality change	0.0		4.4		-2.3		-48.5		4.2		8.1		20.3		177.6	
Contribution (%)		**(%)**		**(%)**		**(%)**		**(%)**		**(%)**		**(%)**		**(%)**		**(%)**
I. Participation	0.7	-1856	2.3	52	0.0	2	4.0	-8	-0.4	-9.1	0.0	0.5	-0.7	-3.3	-0.8	-0.5
II. Returns	-1.9	4870	-3.0	-68	-3.8	168	-22.9	47	0.6	13.4	0.6	6.9	2.1	10.5	10.7	6.0
Education	-1.9	4923	-3.4	-77	-3.4	150	-3.4	7	-0.1	-1.2	-0.2	-3.0	-0.1	-0.7	-2.8	-1.6
Experience	0.1	-387	0.4	8	0.4	-18	6.0	-12	0.1	3.4	0.4	5.0	0.3	1.3	-0.8	-0.5
Regions	0.1	-373	0.4	8	0.0	1	-18.6	38	0.1	2.4	0.2	2.0	0.4	2.0	3.8	2.1
Constant	-0.2	572	-0.4	-9	-0.8	34	-6.6	14	0.4	9.1	0.4	5.4	1.8	8.8	12.2	6.9
Interaction																
III. Endowments																
Education	2.3	-5988	4.3	98	4.6	-202	10.8	-22	0.8	19.9	1.7	21.6	1.5	7.4	1.1	0.6
Earnings effect	2.3	-5968	4.1	92	4.9	-218	14.4	-30	0.9	21.7	1.7	21.6	1.9	9.4	4.9	2.8
Participation induced effect	0.0	-69	0.3	7	-0.3	13	-3.3	7	-0.1	-1.7	0.0	0.2	-0.4	-2.0	-3.9	-2.2
Interaction																
Regions	0.0	61	-0.1	-3	-0.1	5	-1.1	2	0.0	0.8	0.1	0.9	0.1	0.6	0.8	0.5
Family size change	-0.6	1571	-1.2	-28	-1.2	52	-6.6	14	-0.4	-8.9	-0.9	-11.2	-0.7	-3.4	-2.1	-1.2
Rest																
IV. Error term	-1.5	3850	-2.8	-64	-4.0	176	-21.6	45	1.1	25.1	2.1	26.3	3.0	15.0	17.5	9.9
V. Interaction																
VI. Non labor income	-3.0	7667	-6.1	-139	-12.0	529	-107.2	221	0.9	22.3	1.8	22.9	3.1	15.2	19.2	10.8

Table A.2.A

Decomposition of Changes in Individual Income Inequality, 1978-1988 and 1988-1995. Rural Colombia.

	Contribution to change in inequality															
	1978 to 1988								1988 to 1995							
	GINI		E(0)		E(1)		E(2)		GINI		E(0)		E(1)		E(2)	
Inequality 1978	38.5		28.8		26.5		36.7									
Inequality 1988	39.0		31.6		26.6		33.0		39.0		31.6		-130.0		33.0	
Inequality 1995									36.6		28.7		23.5		28.0	
Inequality change	0.5		2.8		0.1		-3.7		-2.4		-2.9		153.5		-4.9	
Contribution (%)		(%)		(%)		(%)		(%)		(%)		(%)		(%)		(%)
I. Participation	-1.7	-337	3.7	131	-2.9	-5830	-2.9	78	-0.9	39	0.9	-31	-1.3	42	-1.0	21
II. Returns	-3.0	-609	1.7	62	-5.4	-10760	-8.7	233	-1.7	71	0.0	1	-2.0	65	-1.3	26
Education	-2.8	-561	2.3	81	-5.0	-9920	-8.0	213	-1.2	50	0.6	-22	-1.4	47	-0.8	16
Age	-1.6	-311	3.9	140	-2.8	-5540	-3.1	82	-1.3	55	0.5	-17	-1.7	56	-1.5	31
Regions	-2.0	-409	2.9	104	-3.4	-6750	-2.9	78	-1.1	44	0.6	-22	-1.4	45	-1.0	20
III. Endowments	7.7	1548	-5.0	-179	12.5	25010	13.2	-352	-0.4	-88	3.5	126	0.0	-94	1.1	-30
Education	-2.8	-554	4.2	149	-5.1	-10140	-7.1	189	-1.3	53	1.5	-51	-1.6	53	-0.1	3
Earnings effect	-0.5	-106	-0.8	-27	-1.1	-2210	-2.9	78	-0.2	6	-0.4	15	0.0	-1	1.0	-20
Participation induced effect	-2.2	-448	4.9	176.0	-4.0	-7930	-4.2	111.0	-1.1	47.0	1.9	-66.0	-1.7	54.0	-1.1	23.0
IV. Error term	-2.5	-502	2.4	85	-4.2	-8320	-5.3	141	-1.8	78	-0.1	4	-2.7	87	-4.0	82

Table A.2.B
Decomposition of Changes in Household Income Inequality, 1978-1988 and 1988-1995. RURAL Colombia.

	Contribution to change in inequality															
	1978 to 1988								1988 to 1995							
	GINI		E(0)		E(1)		E(2)		GINI		E(0)		E(1)		E(2)	
Inequality 1978	43.5		33.8		34.6		60.3									
Inequality 1988	44.4		37.3		35.0		50.5		44.4		37.3		35.0		50.5	
Inequality 1995									40.7		30.0		29.4		45.8	
Inequality change	1.0		3.5		0.4		-9.8		-3.7		-7.3		-5.6		-4.7	
Contribution (%)		(%)		(%)		(%)		(%)		(%)		(%)		(%)		(%)
I. Participation	-1.0	-108	-0.3	-8	-1.7	-452	-2.6	26	-0.4	12	-0.6	8	-0.7	12	-0.9	19
II. Returns	-1.1	-109	-2.0	-58	-1.9	-499	-3.6	37	-0.2	6	-0.6	8	-0.3	5	0.0	1
Education	-0.9	-88	-1.3	-38	-1.6	-416	-3.5	35	-0.1	4	-0.2	3	-0.1	2	0.0	-1
Age	-0.1	-14	-0.3	-10	-0.3	-76	-0.9	9	0.1	-4	0.1	-2	0.2	-4	0.6	-13
Regions	-0.1	-6	-0.4	-10	0.0	10	1.1	-12	-0.2	6	-0.4	6	-0.4	7	-0.6	14
III. Endowments	3.6	372	6.8	196	4.8	1267	-2.6	26	0.6	66	4.2	121	0.4	115	-8.4	85
Education	-0.5	-55	0.3	9	-1.3	-331	-4.7	48	-0.4	11	-2.2	30	-0.5	9	-1.2	26
Earnings effect	0.0	-3	0.1	3	-0.2	-55	-1.1	11	-0.2	6	-0.7	9	-0.5	8	-1.5	33
Participation induced effect	-0.5	-52.0	0.2	6.2	-1.1	-275.9	-3.6	37.0	-0.2	5.2	-1.6	21.3	0.0	0.8	0.3	-6.7
Family size change	-1.0	-100	-1.7	-48	-0.4	-99	78.1	-795	-0.7	20	-0.1	8	0.1	-1	-10.8	231
Rest	5.1	527	8.1	234	6.5	1697	-76.0	773	0.3	35	2.9	83	0.4	107	16.9	-173
IV. Error term	-0.5	-55	-1.0	-30	-0.8	-217	-1.0	10	-0.6	16	-1.0	-37	-1.0	-32	-2.1	-5

Table A.3

Mean Income. Impact of change in the constant of the earnings equation (%)

	1988-95	1978-88	Relative income, 1988 (*)
Male Wage Earners	0%	3%	1.00
Male Self Employed	7%	-9%	1.20
Female Wage Earners	-13%	6%	0.80
Female Self Employed	61%	40%	0.68

(*) Relative to wage earners average.
Source: Author's simulations and calculations.

Table A.4.A
Modeling the Number of Years of Schooling

	Urban			Rural		
	1978	**1988**	**1995**	**1978**	**1988**	**1995**
Age	3.99021 *	3.86210 *	2.72026 *	1.91356 *	2.07900 *	2.06230 *
Age^2	-0.17786 *	-0.16236 *	-0.11020 *	-0.09320 *	-0.09290 *	-0.08992 *
Age^3	0.00365 *	0.00318 *	0.00210 *	0.00199 *	0.00182 *	0.00173 *
Age^4	-0.00004 *	-0.00003 *	-0.00002 *	0.00002 *	-0.00002 *	-0.00002 *
Age^5	0.00000 *	0.00000 *	0.00000 *	0.00000 *	0.00000 *	0.00000 *
Male	0.58770 *	0.50286 *	0.29735 *	0.05858	-0.09250 *	-0.31938 *
Barranquilla	-1.28280 *	-1.24493 *	-0.35636 *			
Bucaramanga	-1.46570 *	-1.09083 *	-1.24457 *			
Manizales	-0.96875 *	-1.12754 *	-0.87689 *			
Medellin	-1.40963 *	-1.13693 *	-1.05497 *			
Cali	-0.63724 *	-0.73971 *	-0.83780 *			
Pasto	-0.63325 *	-0.66495 *	-0.38674 *			
Cartagena	-1.55282 *	-0.62283 *	-0.76620 *			
Atlántica				-0.55480 *	-0.81550 *	-0.52160 *
Oriental				0.37080 *	0.36411 *	0.36420 *
Central				-0.22894 *	0.16526 *	0.33530 *
Constant	-25.07898 *	-25.06618 *	-15.20269 *	-10.15570 *	-10.64050 *	-10.24930 *
R-squared[■]	0.11950	0.10920	0.10660	0.1336	0.1756	0.1835
No. observations	7527	35030	32774	13084	18781	19992

* Significant at 95% level

[■]For Rural: Adjusted R-squared

Source: Encuestas de Hogares del DANE

Table A.4.B

Modeling the Number of Children per Household

	Urban			Rural		
	1978	**1988**	**1995**	**1978**	**1988**	**1995**
School Head	-0.04716 *	-0.03464 *	-0.02352 *	-0.06260 *	-0.0306 *	-0.0221 *
School Spouse	-0.18464 *	-0.14001 *	-0.08446 *	-0.06320 *	-0.0478 *	-0.0389 *
School^2 Spouse	0.00880 *	0.00616	0.00317 *			
Age Head	-0.00752 *	-0.00733 *	-0.00857 *	-0.00111	-0.0031 *	-0.0021
Age Spouse	0.11060 *	0.14188 *	0.12405 *	0.17190 *	0.1534 *	0.1383 *
Age^2 Spouse	-0.00132 *	-0.00364 *	-0.00338 *	-0.00459 *	-0.0046 *	-0.0042 *
Age^3 Spouse	0.00000	0.00002 *	0.00002 *	0.00003 *	0.00003 *	0.00003 *
Barranquilla	0.45701 *	0.40819	0.39450 *			
Bucaramanga	0.33831 *	0.04006	0.07555 *			
Manizales	0.14978	0.07072	0.00196			
Medellin	0.35287 *	0.10241 *	0.05669 *			
Cali	0.05298	0.01649	0.08177 *			
Pasto	-0.04702	0.23353 *	0.20298 *			
Cartagena	0.82505 *	0.53157 *	0.28898 *			
Atlántica				0.23211 *	0.1618 *	0.2385 *
Oriental				0.06420	-0.0066 *	0.0353
Central				0.06307	-0.1102	0.0373
Constant	1.42839 *	1.26377 *	1.21682 *	1.01386 *	1.000625 *	0.80718 *
No. observations	2847	14247	13706	3504	5603	6020

* Significant at 95% level

Source: Encuestas de Hogares del DANE